Through the use of "drop-down" input screens, the model provides the user with alternative input feeds that impact non-recurring service costs. These input screens include the following:

NRC Model - Control Panel: Prompts the user to select NRC element type and state.

Customize Batch: Allows the user to exclude elements from a Batch Run Scenario.

Manual Labor Rates: Prompts the user to either accept or override default values for the input labor rates.

Other NRC Model Inputs: Prompts the user to either accept or override default input values for the following ***NRCM*** inputs. (Note: the Assumptions and Inputs of the model are described in more detail later in this document)

- Copper Loop Percentage
- Central Office Staffing Ratio (% of lines served via staffed central offices)
- Average Trip Time
- Average Setup Time
- Work Activities per Order (in central office)
- Percentage Dedicated Facilities
- Variable Overhead (%)
- POTS System Fallout
- Complex System Fallout

After the user has selected an element type, and has accepted or adjusted any of the default inputs, the model selects all of the activities associated with that particular non-recurring element type based upon the assignment table. Once these activities are selected, the model calculates the cost of each activity using the following formula:

Activity Cost = (Activity Probability (%) x Time (minutes)) x Rate ($ per hour) / 60

The chart below demonstrates how the model performs this step:

A	B	C	D=(AxBxC)/60	
Probability (%)	Time (minutes)	Rate ($/hour)	Cost w/out Overhead ($)	
NA				
100.0%	-	R	$	-
NA				
100.0%	-	R	$	-
40.0%	2.50	36.64	$	0.61
2.0%	20.00	36.64	$	0.24
40.0%	0.25	36.64	$	0.06
40.0%	2.00	36.64	$	0.49
40.0%	0.25	36.64	$	0.06
40.0%	1.50	36.64	$	0.37
2.0%	-	R	$	-
2.0%	2.50	33.87	$	0.03
2.0%	15.00	33.87	$	0.17
60.0%	-	R	$	-

As reflected above, an assumption in the model is that **forward looking OSS investments** and system processing costs should be **recovered elsewhere, in competitively neutral recurring rates,** as opposed to non-recurring rates. Therefore, the costs of these activities are set to zero by the placement of an "**R**" in the ***Rate*** input field.

Finally, the model sums the costs of all appropriate activities for each element type and then applies the user defined "overhead factor" to arrive at the total cost of providing the element.

D. Generate Results

After all calculations have been completed, the model populates the results into a table. NRC element types that are run individually are output by the model as follows:

NRC #	Alabama - NRC Elements	Total Cost		Total Cost	
7	POTS / ISDN BRI Install (UNE Loop)	$ 1.90	<-- with overhead	$ 1.72	<-- without overhead

When results are run in batch mode, the model outputs the cost of each NRC element type generated by the model in a single table.

2. Variable Input Fields

2.0 General

The element types that were initially selected for calculation by the model were developed based on a review of the charges proposed by ILECs during negotiation and arbitration proceedings. These element types consist primarily of all work activities performed in the delivery of each service to existing customers (migration)[3] and to new customers (installation)[4]. The following details each of the element types included in the NRC Model. Included is a sample NRCM output (Attachment B) and a list of the detailed work activities (Attachment C). Within the model, the user has the ability of either costing individual element types or batch processing all element types at once. It is expected that additional element types will be added to the NRCM in the future, on an as required basis.

3 Migration is defined as moving existing ILEC customers to a CLEC.

4 Installation is defined as the establishment of service for a CLEC customer that is not currently served by an ILEC. Service may be for an existing or new customer premise.

2.1 Key Drivers of Cost

The following are brief descriptions of the 9 easily adjustable variable inputs to the Model which are the principle drivers of non-recurring costs. They are discussed in more detail within this document.

2.1.1 Variable Inputs

1. **Manual Labor Rates ($ per hour)** - Manual labor rates have been developed by state and company for 14 different job classifications. See Section 4 for labor rate development and for job classification details. When the state selection is made, the model provides an input screen containing the labor rates for that particular state/ILEC. Where there is more than one ILEC in a state, multiple selections are available for that state. This screen can be used to modify the default labor rates contained in the model.

2. **Copper Loop Percentage** - This represents the percent of lines served by copper as opposed to lines served by fiber (i.e., TR-303 Integrated Digital Loop Carrier). The model default is 40% copper. The significance of this variable is that there are additional work steps associated with copper plant. This ratio can be user adjusted.

3. **Central Office Staffed Ratio** - This input variable represents the percent of lines in a state that are served out of central offices which have technicians on site. The significance of this variable is that additional travel time and cost is required in order to do work in those offices that are not normally staffed. For example, service orders may require a technician to be dispatched for work to be completed at a non-staffed office. As the default ratio, the NRC Model assumes that 80% of the lines in a state are served by staffed central offices.

4. **Average Trip Time** - This variable accounts for the travel time of a technician. Technicians may need to periodically make trips to the field to rearrange outside plant, or will need to travel to the non-staffed central offices to complete various work activities such as customer orders, on-going maintenance, etc. The Work Management OSS will schedule and develop the work load and activities for the traveling technicians. Thus, the travel time is associated with several work activities, not just one. The default value contained in the NRC Model for the travel time is 20 minutes.

5. **Setup Time** - This user adjustable variable accounts, as an example, for the time associated with setting up cones while working at the Feeder Distribution Interface (FDI) or the Service Area Interface (SAI). A default value of 10 minutes is used in the Model.

6. **Number of Work Activities Per Setup or Trip** - The default for the number of work activities is dependent on the type of service being modeled. The default selected is the assumption that the technician will complete that number of work activities per trip.

7. **Percentage Dedicated Facilities** - This input represents the percentage of dedicated facilities for POTS type service. A default of 100% is used in the model. As indicated in the model by an "R," any cost associated with dedicated facilities should be recovered via recurring rate elements.

8. **Variable Overhead (10.4%)** - This input represents the loading variable overhead expenses not already captured in the model. The input value of 10.4% is used unless otherwise directed by the Commission.

9. **Fallout** - The model includes, where appropriate, manual processes attributable to "fallout". The default value is 2%. The service center assumed is the highest cost service center that might be involved with the given element type. The time estimated includes the following:
   - pulling and analyzing the order
   - assist in processing the order - resolve jeopardy

Probability: Probability represents an adjustment factor which recognizes the impact of changes in the key drivers of cost. (e.g., an element type involving the loop could be a copper or fiber design). There is a 40%/60% relationship between copper and fiber loops. When a copper design is used, the probability is 40%. Probability is the total adjustment factor applied after taking into consideration all of the variables applicable to a particular activity.

Time: Activity times are based on estimates provided by a panel of Subject Matter Experts.

Work Centers: Work centers and work groups were selected based on the panel of Subject Matter Experts' determination of the most likely center to perform this work.

"Non Cost" Steps:

- Processing Times: Times required by an OSS to process an order electronically.
- "R": These costs are recovered elsewhere in a competitively neutral fashion and are defaulted to '0'.
- "NA": Indicates that the step or activity is not a cost to the ILEC.

STATE SELECTION:

3.0 General

The user is able to choose a state jurisdiction to model. State selection is intended to drive the appropriate labor rates for that particular state. Where there is more than one ILEC in a state, multiple selections are available for that state.

4. MANUAL LABOR RATES ($ PER HOUR)

4.0 General

If the user selects a given state's default labor rates, the model selects that state's specific loaded labor rates. Although most ILECs have supplied the labor rates for their states, some have refused to supply labor contracts for all their states. For those states that the ILECs have not supplied labor contracts, the model uses similar rates as proxies. Those states that required proxy rates have been highlighted in red in the States Input Table. The 1997 contract rates were utilized in the Model.

4.1 Labor Rate Highlights

- **State and Company Specific**: Labor rates are state specific to the extent that appropriate collective agreements (union contracts) were obtained. At the writing of this document, with the exception of Connecticut and Alaska, all RBOC contract rates had been included in the Model.
- **GTE Rates**: GTE rates will be calculated separately as the collective agreements are received. At the writing of this document, only Virginia, Pennsylvania, California, Arkansas, New Mexico, Oklahoma and Texas had been completed for GTE.
- **Loading**: The loading used to build the final rates from the collective agreement rates are the same for every state, GTE and Bell. See the labor rate example for the list of loading
- **Productive Hourly Rates**: The labor rates are inflated by approximately 23% to convert them to productive hourly rates. This accounts for time lost on coffee breaks, illness, vacation, training, holidays, etc. The actual calculation assumes 1685 productive hours annually versus 2080 hours paid. This is based on annual productive hours from other studies and on the subject matter expert's professional opinion.
- **Premium Time**: Premium time is added to account for overtime paid. This equates to approximately 10% overtime and only includes the premium portion of the overtime pay.
- **Miscellaneous Costs**: Miscellaneous costs are added (approximately 7%) to cover expenses such as travel costs to attend training, office supplies, non-capitalized hand tools, telephone concessions, etc. This is based on data from other studies and on the subject matter expert's professional opinion.
- **Supervision**: Supervision is included assuming that each supervisor will have 15 reporting subordinates. Second and third level management costs are included and assume a 5:1 ratio plus one support clerk. Including second and third level management in the craft loading means the labor rate is a "fully assigned" rate.

4.2 Labor Rate Rationale

4.2.1 Establishing Labor Rate

The labor rates are calculated on a forward looking basis. This means that the union contract rates and benefits are specified. Labor costs must be controlled through management of the employee related expenses and minimizing labor costs through technology. Overtime and miscellaneous expenses are manageable and set at a reasonable forward looking level.

Some RBOC cost studies use a directly assigned labor rate which includes only first level supervision. (There are exceptions.) The NRCM uses fully assigned rates because:

1. There are some states that require it and we strive for consistency.
2. TELRIC methodology attempts to bring shared costs closer to the activity causing the costs.

We assume that if there were no NRC activities, the management forces through third level could be reduced, thus we elected to share in their costs.

4.2.2 Job Functions and Descriptions

The job functions and descriptions in the union contracts were mapped to the NRCM functions (shown in the table below) by a team of experts with RBOC experience. (See section 27 for a detailed listing of qualifications for the panel of subject matter experts).

Work Group	NRCM Work Center Description
BDAC (Business Dispatched Administration Center)	(Not currently used in NRCM) The BDAC is responsible for handling business customer-initiated order requests (e.g., changes, new connects, moves, etc.) that can be handled over the telephone.
CDAC (Combine Dispatched Administration Center)	(Not currently used in NRCM) The CDAC is responsible for handling residential customer-initiated order requests (e.g., changes, new connects, moves, etc.) that can be handled over the telephone.
CPC (Circuit Provisioning Center)	The CPC is responsible for the assignment of facilities and equipment and the preparation and distribution of WORD documents for message trunk circuits, special access and other designed special service circuits, and carrier systems (e.g.; Transport Systems – DS1, DS3, SONET, Frame Relay, etc.). The CPC generates those circuit designs not produced by the TIRKS system. The Circuit Transmission Engineering Center (CTEC) provides circuit design assistance to the CPC when requested. CPC also uses the Facility Engineering Planning System (FEPS)
CSC (Customer Service Center)	(Not currently used in NRCM)
FCC (Frame Control Center)	The FCC is responsible for the administrative, force control, work control, and analysis functions associated with the installation and maintenance of crossconnects of the loop to the office equipment (OE) also known as the switch port, and their associated activities in central offices. The center is responsible for providing related order status and work completion information to the support systems, COSMOS/SWITCH system, or to Order or Circuit Control Centers. The centers will also be responsible for the support of facility maintenance, and/or substitution of facilities in connection with failures detected by routine testing or customer complaints.
FMAC (Facilities Maintenance Administration Center)	The FMAC is responsible for the functions associated with the installation and maintenance of HICAP services (e.g., DS1, DS3, SONET OCn, STS-1. Frame Relay, etc.).
SS I&M/OSP (Installation and Maintenance/Outside Plant)	These technicians are responsible for installation and repair of outside plant facilities, including cable, drop, protector, network terminating wire, NID, FDI, and other facilities within the F-2 through F-9 OSP.
LAC (Loop Assignment Center)	Loop Assignment Center is responsible for providing, via manual intervention, facility assignments (Inside & Outside Plant)
NTEC (Network Terminal Equipment Center)	These CO technicians are responsible for DS0 and DS0/Subrate Special Services, administering the upkeep and repair of central office (CO) facilities including, but not limited to SMAS, Toll Frames (MDF), Automated Digital Terminal Systems (i.e., AD4, and D5), D4 Channel Banks, Metallic Facility Terminals (MFT) 1/0 DCS, Tie Pair arrangements, Central Office Terminals (COT), etc.
RCMAC (Recent Change	The RCMAC utilizes with MAS (Memory Administration System, which is a

Work Group	NRCM Work Center Description
Memory Administration Center)	generic name for RMAS or MARCH). These systems provide an automatic flow of recent change information to the local switches.
SCC (Switching Control Center)	This center is responsible for monitoring, surveillance, and maintenance of the switches, and for complex translations such as those used for routing, centrex, etc.
SSC (Special Services Center)	This center is responsible for coordination and testing of DS0, DS0/S, DSI, DS3, Frame Relay, and other special access, special service designed services.
Splicing Technician	These technicians perform copper and/or fiber splicing functions.
ICSC (Interexchange Carrier Service Center)	(Not currently used in NRCM) The role of the ICSC is to serve as the primary point of contact for handling the service needs of all customers served under the access tariffs. Generally, this center is only involved when an access service request does not flow-through the electronic gateways and related systems.

The union contract was used to determine the hourly rate paid for the job functions contained in the NRCM. It should be noted that the NRCM is forward looking in that if an ILEC chooses to have a specific function performed by a higher rated employee than is required, the additional cost is solely their responsibility since it is their work force management decision.

4.2.3 Pay Weight Averaging

AT&T and MCI do not have the necessary information to weight average the pay based on the tenure of the work force nor the disbursement of the work force among the various pay zones. Since we did not have the data that would be required to support a more accurate number and to avoid controversy, the NRCM assumes the entire work force is at the maximum rate of pay for their title and they are all working in the highest pay zone in the state. It should be noted that an accurate/reasonable estimate would be preferable to this conservative approach.

4.2.4 Premium Rate

The premium rate loading contains only the premium portion of the pay, not the basic rate, since a productive hourly rate based on annual hours is used. If the basic rate were added to the loading, then corresponding adjustments to the annual productive hours would be required which would vary by job function. The NRCM employs the simpler method of using only the premium pay which represents approximately 10% overtime for the top craft employee. The 10% figure represents the breakpoint for steady state overtime worked. Any more than 10% results in unacceptable reductions in productivity and should warrant a permanent addition to the work force. In a forward looking environment, this is budgeted and controllable.

4.2.5 Miscellaneous Expenses

Miscellaneous expenses are also budgeted and controllable. Some positions may require more expenses than others. For example, a technician will require miscellaneous hand tools and will travel more than those working in the centers. To estimate these costs individually by Job Function Code (JFC) would be highly speculative. Thus, the average was used.

4.2.6 Pay Rate Calculation

Publicly available cost models (e.g., the non-proprietary state of New York for unbundled network elements and any of the BellSouth states for the non-proprietary unbundled network element cost) suggest that benefits generally equate to approximately a 33%-35% increase over the contract labor rates. The *NRCM* uses a 40% benefits loading to avoid controversy since data was not available to support a more accurate number and that our estimate is, therefore, a ceiling. The first through third level management salaries and benefits were calculated and loaded on to the labor rates based on a ratio of 15:1 for contract to supervisory personnel, and 5:1 for the next two layers of management. The salary and benefits for one clerical position were also incorporated.

The loaded hourly rates were inflated by approximately 23% to represent productive hourly rates. This includes paid time off for vacations, holidays, personal days, training, coffee breaks, etc. Miscellaneous expenses were added to cover such items as travel expense, training, and office supplies. Finally, another increment was added to cover premium pay for overtime worked.

Provided below is an example of the labor rate calculation.

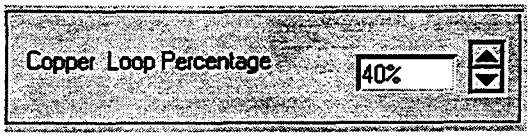
Wage Rate Components	Input	Hourly	Cumulative	Derivation
Basic wage rate		$20.00	$20.00	Union contract
Benefits loading	40%	$8.00	$28.00	Subject matter expert
Non productive time loading	123%	$6.56	$34.56	2080 paid hrs / 1685 prod hrs
Overtime loading		$1.78	$36.34	$3000 annual overtime / 1685 prod hrs
Miscellaneous loading		$1.19	$37.53	$2000 annual misc exp / 1685 prod hrs
First line supervisor salary w/benefits	$75,000			SME estimate
First Level hourly w/benefits	$36.06			Salary & bene / 2080 paid hours
First Level hourly		$2.40	$39.94	1st level sal & bene / 15 reports
Second level mgmt. ave. salary w/benefits	$105,000			SME estimate
Second level hourly w/benefits	$50.48			Salary & bene / 2080 paid hours
Second Level hourly		$0.67	$40.61	2nd level sal & bene / 75 reporting people
Third level ave. salary w/benefits	$135,000			SME estimate
Third level hourly w/benefits	$64.90			Salary & bene / 2080 paid hours
Third level sal. (Hr.) divided by 375		$0.17	$40.78	3rd level sal & bene / 375 reporting people
Support Clerk ave. salary w/benefits	$51,800			SME estimate
Support clerk hourly w/benefits	$24.90			Salary & bene / 2080 paid hours
Support clerk sal. (Hr.) divided by 375		$0.07	$\boxed{\$40.85}$	Support clerk sal & bene / 375 people

5. COPPER LOOP PERCENTAGE

5.0 General

This represents the percent of lines served by copper as opposed to lines served by fiber (i.e., TR-303 IDLC (Integrated Digital Loop Carrier)). The model default is 40% copper, 60% fiber. This value is based on engineering expertise and the TELRIC scorched node approach that represents the copper/fiber ratio that one would expect to see in a forward looking network build. The significance of this variable is that there are additional work steps associated with copper plant.

The Copper Loop Percentage can be user adjusted in increments of 1% via the input box "spinners". The user can also input a value such as 45.1% directly into the spinner boxes.

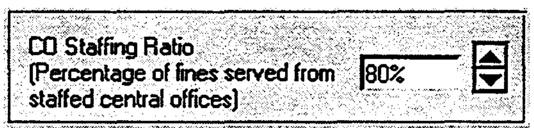


6. CO STAFFING RATIO (% OF LINES SERVED BY STAFFED CENTRAL OFFICES (CO)

6.0 General

This input variable represents the percent of lines in a state that are served out of central offices which have technicians on site (i.e., staffed central office). The significance of this variable is that additional travel time and cost is required in order to do work in those offices that are not normally staffed. For example, service orders may require a technician to be dispatched for work to be completed at a non-staffed office. As the default ratio, the NRC Model assumes that 80% of the lines in a state are served by staffed central offices. The 80% default was determined by the panel of Subject Matter Experts in combination with data request responses received from other ILECs.

The CO Staffing Ratio can be user adjusted in increments of 1% via the input box "spinners". The user can also input a value such as 79.5% directly into the spinner boxes.

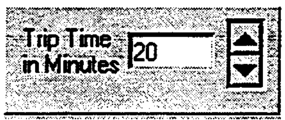


7. AVERAGE TRIP TIME (MINUTES)

7.0 General

This variable accounts for the travel time of a technician. These technicians may need to periodically make trips to the field to rearrange outside plant, or will need to travel to the non-staffed central offices to complete various work activities such as customer orders, on-going maintenance, etc. Travel time would normally only be associated with sub-loop unbundling for the purposes of the NRCM. The Work Management OSS will schedule and develop the work load and activities for the traveling technicians. Thus, the travel time is associated with several work activities, not just one (see Figure 7-1 below) The default value contained in the NRC Model for the travel time is 20 minutes.

The Average Trip Time can be user adjusted in increments of 1minute via the input box "spinners". The user can also input a value such as 15.5 minutes directly into the spinner boxes.



7.1 Assumptions

The Model assumes that for a:

Central Office Technician

- A technician will return to his or her reporting center at the end of the work day.
- A technician will travel, in a metropolitan area, an average of not more than 6 to 10 miles to a non-staffed central office.
- The non-staffed central office has a secure parking lot. Therefore, no setup/tear down time is required.
- All special tools and test sets are existing in the non-staffed central office.
- The central offices are approximately 3 to 5 miles from each other.
- The furthest non-staffed central office is no more than two (2) central offices away from the staffed central office.
- Travel time of 20 minutes was estimated.
- 4 activities would be performed on each central office visit.
- Intra-Office travel or travel between floors within the Central Office, has been averaged at 10 minutes, when such travel is likely.
- Incidental travel time has been included within discrete steps e.g. Pull and Analyze step at 2.5 minutes will include the average time travel for the technician to go from a terminal where work orders are received, to the equipment/frame location. In most instances, technicians will carry more than one work order at a time from the terminal.

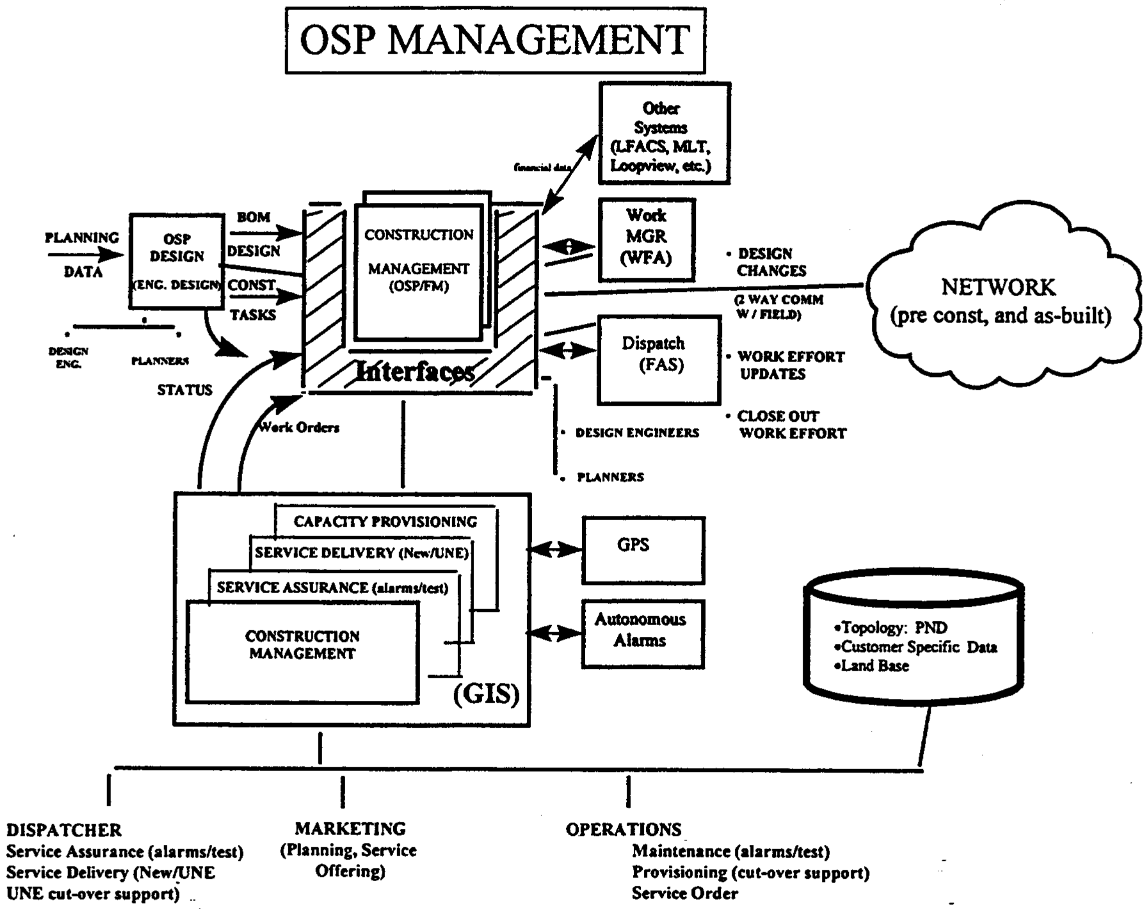
Installation/Outside Plant Technician

- A technician will return to his or her reporting center at the end of the work day.
- The SAI (Serving Area Interface) or FDI (Feeder Distribution Interface) for the initial service order is approximately 10 miles from the dispatch garage (where technicians obtain the service orders).
- The technician will perform at least 2 activities per trip to an SAI(s) within a Distribution Area.
- The time to drive to the first SAI and subsequent SAIs was modeled in the NRCM (see Figure 7-1).
- The drop is in place and will accommodate at least 2 customer lines all the way to the NID (Network Interface Device)
- The technician has mechanized access to service orders or other OSS while in the 'field'.
- Travel time of 20 minutes was estimated.
- Subsequent travel to the next SAI/FDI or next location requires additional time to set up and tear down.

7.2 Use of GPS & GIS

In a forward-looking efficient environment, assumptions of Dispatching to the OSP include the use of a Field Access System (FAS) that - in addition to the two activities - allows additional provisioning, repair, and maintenance routines to be downloaded automatically from the WFA/DO system via cellular communications. FAS also provides access to loop and cable pair inventory assignment and inventory OSS systems such as LFACS, and test systems such as MLT and SARTS.

It is important to understand that the RBOC vehicles are assumed to be equipped with a global positioning system (GPS) that can be continuously tracked/monitored as far as location, and overlaid on a geographical information system (GIS) such as Map-Info GIS or similar system. This allows the I&M centers to track the location of the I&M vehicle so that they can download additional provisioning, repair, and maintenance activities to the I&M technicians who are closest to, or within the Distribution Area via the aforementioned WFA and FAS OSS systems. Finally, since poles, conduits, pedestals, remote terminals (DLC), CEVs, etc. can be overlaid from the OSP/FM system to the GIS, it allows Alarm LEDs (via Loopview, Loop Surveillance, and NMA surveillance OSS systems) to appear on the GIS GUI so that again, the dispatch center can pinpoint the location of the failure, and through their GPS, locate the closest I&M tech, break their load (provisioning orders), and dispatch them via WFA/DO and FAS to repair the network OSP failure. Using this forward-looking OSS architecture - which is generally available today - a technician should never be required during the course of the day to return to the garage.



7.3 Reasons for Travel

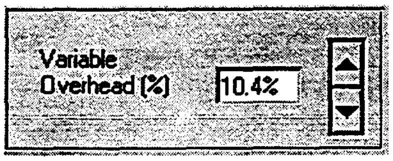
- As stated earlier, travel is normally only associated with loop unbundling activities (this is non-recurring work.)
- A 'new' access line that was not DOP (see section 18) would be required. Assuming that DOP practices are utilized, a technician will be required to travel to a SAI/FDI only when a manual cross connect is required. This is a cost which is recovered elsewhere.
- To perform a rearrangement or when additional lines are required to a premises where DOP is not established or where service has never been established. These are also costs that are recovered elsewhere.

8. VARIABLE OVERHEAD

8.0 General

This 10.4% input represents the loading variable overhead expenses not already captured in the Model (e.g., Management above Level III, Human Resources, etc.). Unless otherwise directed by a State Commission ruling, the default is 10.4%. The 10.4% default estimated was provided by the Hatfield Model developers and is based on analysis of reported ILEC data.

This ratio can be adjusted in increments of 0.1%.



9. FALLOUT

9.0 General

Fallout can best be defined as local orders that were designed to flow through automated OSSs and activate Intelligent Network Elements, but fail to do so.

This model assumes a 98% flow-through (i.e., a 2% fallout rate) for ordering and provisioning (SWBT transcripts for EASE (Easy Access Sales Environment) UNE-P / TSR and UNE flow through provisioning have determined 99% to be the operating level). This model has used fallout rates that can be expected in a forward-looking, competitive telecommunications environment.

Two percent fallout can be achieved with Legacy OSS when there is a will to optimize all of a system's capabilities and implementation of effective and sustained system management processes.

We have cited data in SWBT where both simple and complex orders were discussed in the pre-hearing session. SWBT representatives did indicate that there were orders that would always require manual attention due to their uniqueness and complexity. On an average day, SWBT would process 65,000 orders and on a busy day 103,000 with a 99% flow through. On an average day, 1300 orders would be processed manually. The figure 2% for fallout was set for both POTS and complex orders. This level is based on citing in SWBT as well as consideration for the basic qualities of an efficient flow through process.

As an example of what might cause fallout, assume, as is the case with the ILEC Legacy OSS platform, that several OSS are electronically linked to create a flow-through electronic provisioning process. If one of the OSS receive erroneous or incompatible information from another OSS, the order will fallout of the electronic process and will require manual intervention to correct or complete the order.[5] However,

[5] Consistent with the assumption mentioned above that efficient companies employ system administration practices that include database synchronization and system release administration procedures, it is important to note that it would be inappropriate to allow the ILECs to pass along costs to CLECs for all cases in which fallout is caused by erroneous or incompatible information. To a significant degree the quality of a service order issued by a CLEC will be driven by the quality of information that the CLEC obtains from the ILEC. For example, most of the information on a CLEC order to convert an existing customer will be obtained in the pre-ordering directly from the ILEC's database. If the ILEC provides incorrect or un-synchronized data to the CLEC during the pre-ordering phase, the CLEC should not be accountable for any subsequent fallout caused by that incorrect data.

fallout is not simply a manual process, *per se*. Fallout can be resolved via electronic means which streamline and eliminate many of the manual steps now required to manage exceptions or fallout. The PAWS system (Provisioning Activity Work Station) is one such OSS which works in a provisioning flow through environment, communicating easily with service request controllers and other operations systems. We recognize that systems are evolving to assist in resolving fallout, (e.g., PAWS) and would expect greater improvements in this area in the future.

ILECs are utilizing network and OSS technology assumptions and cost history which are not forward looking as directed by the FCC. Typically, assumptions by ILECs lead to fallout and the need for costly manual intervention to permit service orders to continue towards completion. This will lead to cost outputs which will not support competitive pricing and a competitive marketplace for customers.

We are at the turning point for major efficiency changes in the OSS as a result of new database architectures and process communication links. The TMN architecture is taking hold and will deliver further performance improvements that are necessary in a competitive environment. As stated in GR 2869 CORE,.. "Telecommunications service providers are facing increased competition for market share. To be competitive and provide quality service they need high-quality operations capabilities to support their service offerings and they need to design their operations architecture to be efficient , cost effective and rapidly deployable."

Once the electronic interfaces to the system components throughout the processes are in place, and the new entrant's personnel have the same (parity) access, read/write as required, as the ILEC attendants, fallout levels of 1-2% are reasonable. The only real impediments to this, beyond poorly managed ILEC databases, is the placement of ineffective interfaces and the use of network elements that are not forward looking and capable of intelligent communications with network OSS. Database maintenance is clearly a shareholder expense that has not been undertaken as it should have been. All databases should be maintained current and synchronized at all times as a matter of good business. Not paying to maintain these databases is a decision resulting from expense funding availability in past years. ILECs should not be allowed to use costs in their models, that reflect embedded technology, and inefficient operational systems and processes (high levels of fallout are synonymous with inefficient systems and processes). The impediments should not drive costs to new entrants. Moreover, the primary means to ensure that the ILECs do not purposely deploy such inefficiencies to create service quality barriers to entry is to ensure that the ILECs bear the costs of all inefficient processes that it does maintain.

Instead, the ILECs should build and pay for this work, and should demonstrate excellent performance to ensure that effective interfaces are constructed. Otherwise, there is no motivation to have a least cost and effective interface in place.

FALLOUT CAUSES

There are four major categories of electronic flow-through provisioning fallout.
1) Database synchronization errors
2) Network element denial
3) Communication errors
4) Synchronization errors

There are also 5 other possible OSS related problems that can cause provisioning fallout.
1) New software release incompatibility (OSS/OSS or OSS/INE).
2) Hardware platform failures
3) Operating System failures.
4) User application layer failures.
5) Other (held orders, network exhaustion, etc. - related to element denial)

Database synchronization errors occur when databases that contain identical data do not match, or they disagree as to the availability or status of a needed resource. Typical database synchronization errors that fallout include street names that exist in one database that are not duplicated in other databases. Another example is when facilities marked as 'spare' (i.e., available for assignment) in one database are not reflected as available in another database.

Network element denial is a second type of fallout. It can happen when an Intelligent Network Element (INE), such as a Local Digital Switch, responds that it cannot perform a task requested by another component of the network for whatever reason. For example, the Element Management System might believe that a certain version of software is available to activate certain features, when in reality the installation of this software has not yet been completed.

Communication errors represent the failure of the communications links between OSS, the Element Management Systems (EMS), and/or the INE. These errors take place because a valid communication path cannot be found between the elements.

Synchronization errors occur when two separate components (OSS to OSS or OSS to EMS & INE) attempt to communicate, but fail to establish the necessary communications protocols, even though the link is functioning.

New software release incompatibility is where a software release residing on an OSS or network element is not compatible with the software residing on another OSS(s) or network element(s).

Hardware platform failures are where the OSS operating hardware, (workstation, mini-computer, mainframe) experiences an equipment failure that prevents all or part of the operations to be performed in an automated flow through manner.

Operating System and Applications level failure are failures related to the software residing on the hardware that prevents all or part of the operations from being performed in an automated flow-through matter.

Of the nine categories of fallout, the error that occurs most often is database synchronization error. Thus the degree of fallout from these four categories can and should be minimized by properly maintaining the OSS databases and the telecommunications network.

In determining the input values for fallout, in both a simple (POTS) and complex environment, the ***NRCM*** draws upon industry experience and comparable industry information[6]. Relying on the assumption of efficiently operated OSS and processes, the default fallout rate utilized in the ***NRCM*** is 2%. This is further supported in Bellcore GR-2869, where according to Section 4.6.2 (Immediate Service Activation) "Activation will occur at the time of assignment" (i.e., immediately)[7]. OSS processes that allow for direct or immediate activation can significantly reduce fallout because the service order generator learns immediately if an order cannot be made effective. Thereby, the order generator has the opportunity to obtain additional information and ensure that the order can be processed within the context of the original customer contact.

6 Southwestern Bell recently indicated in its Texas filing that their EASE system, which services residential lines, has a fallout rate of 1% (transcripts; Open Meeting Pre-hearing Conference- 6/24/97- Southwestern Bell before the P.U.C. and A.L.J.) In addition, US West states in a cost study filed before the Minnesota Public Service Commission on 7/11/97 that "97% of all CSB PIC Changes are completely mechanized."

7 Bellcore GR-2869, Issue 2, (Oct.1996) pg. 4-25, section 4.6.2

There are ILECs that have systems and processes that deliver services built with unbundled network elements, and their fallout levels are approaching, at, or better than, what our model proposes for certain service delivery. Also, the ILEC is proposing to deliver similar performance for other end to end service delivery. (e.g., SWBT transcripts for EASE/ TSR and UNE flow through provisioning. This system is for residential and business applications. The new entrants service representative has command of the same legacy systems as SWBT. This system typically handles 65,000-103,000 orders per day with 1% of the orders falling out of the system. SWBT has indicated that its expectation for this electronic solution for the new entrants will also have a 1% fallout. If the order falls out of the system the new entrant has the ability to correct the problem). (HELPDESK assistance will be available from the ILEC on an as required basis)

Once the electronic interfaces to the system components throughout the processes are in place, and the new entrant's personnel have the same (parity) access, read write as required, as the ILEC attendants, fallout levels of 1-2% are reasonable. The only real impediments to this, beyond poorly managed ILEC databases, are the placement of ineffective interfaces and the use of network elements that are not forward looking and capable of intelligent communications with network OSS. These impediments should not be at the expense of the new entrants.

To ensure that effective interfaces are constructed, the ILEC should build and pay for this work, and should demonstrate excellent performance. Otherwise, there is no motivation to have a least cost and effective interface in place.

The deteriorated databases are clearly a shareholder expense that has not been undertaken as it should have been. All databases should be maintained current and synchronized at all times as a matter of good business. Not paying to maintain these databases is a decision resulting from expense funding availability in past years.

This variable is user adjustable for both POTS and complex fallout.

10. NUMBER OF WORK ACTIVITIES PER TRIP OR SETUP

10.0 General

The average number of work activities is determined by the element type being provisioned. The central office technician will perform activities within the central office and the installation/outside plant technician will perform activities at the SAI (Serving Area Interface) or FDI (Feeder Distribution Interface). There could be more than one SAI or FDI within the same Distribution Area.

10.1 Examples - Central Office Technician (COT)

The dispatched CO technician will not only place cross connect jumpers at the non-staffed CO but perform other provisioning (maintenance) related activities. Some examples include:

- Other provisioning activities for the ILEC or other new entrants.
- When one service order contains two (2) lines, the technician will provision both lines at the same time and will not make a separate trip to the same CO.
- The technician may perform maintenance routine work loaded on the same visit. These maintenance routine costs are recovered under recurring rates.

10.2 Examples - Installation/Outside Plant Technician

The dispatched Installation/Outside Plant technician, may also perform additional activities.. Some examples are:

- Orders for the ILEC and other new entrants within the same Serving Area Interface (SAI). The work activities could be at the same location or within the same area.
- When one service order contains two (2) lines, the technician will provision both lines and will not make a separate trip to the same location.
- The technician may be assigned to activities that require rearrangements which would be recovered under recurring rates.
- The technician may be assigned or identify routine maintenance activities that need to be done along with the order e.g. replace crossconnect wire spool, incidental cabinet hardware maintenance, remove left-in jumpers, etc.

10.3 Intra-Office Travel

Intra-office travel is the time required by a technician to travel within the office. An example would be when connecting SMAS test points for a designed circuit. The LDPF (Cosmic-Type) cross connections may be on Floor 1 and the TDF or IDF, where the SMAS test points appear, may be on Floor 3. The technician requires time to reach the second location where the SMAS test point cross connections are to be made. This is consistent with the collocation model which maintains that the switching, transmission and miscellaneous equipment can be established within 3 floors of a telecommunications complex.

10.4 Rationale

The activities are closely related to travel time. The assumption associated with this activity revolves around the fact that the technician does not return to the dispatch garage for each service order. The technician can receive service orders at the garage where service orders are printed and distributed to the pool of technicians at the start of the work tour. Another means of getting service orders when not at the reporting location is to access a mechanized Work Force Management (WFM) system using portable terminals.

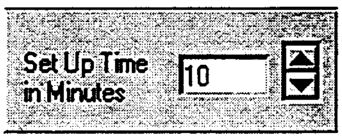
The multiple activities per trip means that the technician may perform multiple activities within the same non-staffed CO or same Distribution Area. Examples of the activities could include but are not limited to running and connecting cross connect jumpers, connecting the drop at a distribution pedestal.

11. SETUP TIMES (MINUTES)

11.0 General

This user adjustable variable accounts, as an example, for the time associated with setting up cones while working at the Feeder Distribution Interface (FDI) or the Service Area Interface (SAI). A default value of 10 minutes is used in the Model.

Setup times can be adjusted in 1 minute increments via the input box "spinners". The user can also input a value such as 5.5 minutes directly into the spinner boxes.



11.1 Central Office Technician

The CO technician will not have any set up or tear down time. Non-staffed CO's have secure parking lots and therefore there will be no set up or tear down time required for a technician when sent to these locations.

11.2 Installation/Outside Plant Technician

The set up and tear down time for the outside technician is minimal. There may be occurrences when additional time may be required. The outside technician set up and tear down time will vary depending on the specific weather conditions. For example, during inclement weather (e.g. rain, snow, sleet) tents or some form of protection will be required to protect the work area and the exposed equipment. Even with this assumption the average time to set up and tear down is 5 minutes.

12. PROBABILITIES

12.0 General

A probability represents the percentage of time a particular work function/activity is performed when processing a particular service offering. For example, if 20% of the lines are served by non staffed central offices, the probability of travel time would also be 20%.

Probability factors are utilized in the formulation of Activity Costs as follows:

ACTIVITY COST = PROBABILITY (%) X TIME (MIN) X LABOR RATE ($) / 60 (MIN)

Attachment 'C' provides probability factor details and the associated formula for each task or activity used in the Model

Each of the activities or events in the Model could occur in a service delivery process to some degree or not at all. Therefore you will see probabilities ranging from 0-100%, or designated N/A, where an activity is part of the overall process but because it is performed by the CLEC or is a CLEC system activity, it is not part of the ILEC Activity Cost calculation.

12.1 Probability Types

Probabilities are variable. They can be state specific ratios, observation or study related, Subject Matter Expert estimate, based on Data Request responses or model default values (e.g., Copper Loop Percentage, Fallout %, etc.).

Following are the NRC Model input default settings that may be used within probability calculations or may be directly assigned as a probability:
- Copper Loop Percentage........................40%
- CO Staffed/Unstaffed Ratio.....................80%
- Fallout % POTS....................................2%
- Fallout % Complex.................................2%
- Percent Dedicated Facilities..................100%
- Number of Activities per Trip.....................4

12.2 Probability Examples:

1) ***ILEC Gateway requests address data from Admin. Info. System and CSR:*** During pre-ordering, there is a 100% Probability that the ILEC gateway requests address data from Administrative Information System and CSR. (Note: Since this activity is performed by a system, even though the CPU time is infinitesimal, it is a (Recurring) cost which is not included in the ILEC Activity Cost.). There is a high degree of confidence in the Probability stated even though there has been no extensive study to determine the 100%. This is a logical assumption as this is a logical step in a logical process.

2) ***LFACS makes OSP assignments, e.g. cable and pair:*** During provisioning, there is a 100% Probability that LFACS makes Outside Plant Assignments, e.g. cable and pair. As in a), there is a high degree of confidence in this logical Probability. There are numerous other 100% Probabilities with a high degree of confidence based on the fact that it is a system activity that is logical in the service process flow.

3) ***Install DSX cross connect (5 Wire):*** During the Provisioning of a Channelized DS1, there is a 100% Probability that someone in the FMAC will pull and analyze the order. This is a non-system, manual, activity where there is a high degree of confidence that this activity will take place because it is a logical step in this service type flow, and that there is nothing that will influence the degree or quality

of the probability such that it will be anything but 100%. There are a number of similar manual activities where 100% Probability is also applied. Again, there was no extensive study, with respect to probability as this step is logical.

4) ***Manual Activity***: During the provisioning of a 2 Wire Loop, the process time could be influenced by the fact that the loop selected is either copper or fiber. In the default scenario it is pointed out that out of a typical 100 loops, 40 would be copper and 60 would be fiber. This ratio was derived from engineering expertise and the TELRIC scorched node approach that represents the copper/fiber ratio one would expect to see in a forward looking cost effective network build. There is a 60% probability that the loop will be fiber and a 40% probability of it being copper. A lower % Copper will reduce the ILEC Activity Cost as fiber technology requires only system activity to do the loop provisioning. However, the labor savings may be negated by the higher capital costs for fiber in loops under 9kft.

5) ***Fallout: Pull and analyze the order***: During provisioning, the process time could be influenced by the degree of fallout. Fallout is not generally 100%, but actually should be at the other end of the spectrum. We have cited data in SWBT where both simple and complex orders were discussed in the pre-hearing session. The SWBT representative did indicate that there were orders that would always require manual attention due to their uniqueness and complexity. On an average day, SWBT would process 65,000 orders and on a busy day 103,000 with a 99% flow through. On an average day 1300 orders would be processed manually. The figure 2% for fallout was set for both POTS and Complex orders. This level is based on citing by SWBT as well as consideration for a process that is efficient and has the qualities of an efficiently and effectively managed system and process.

6) ***Travel time to the Central Office (non staffed) / 4 work activities***: During the provisioning of a 2-Wire Loop, there may be occasions where travel is required to a remote central office as 80% of lines are served from staffed offices. This would only occur where copper loops are involved as fiber technology designs can be provisioned remotely due to the intelligent nature of the elements. Therefore, in order to accurately reflect this occasional cost, a formula is applied [(CO_Staffed%) X (Copper_Percentage) / (Number of Orders per Trip)] which equates to be [(20%) X (40%) / (4)] = 2%. The 4 orders per trip is seen as a conservative load assignment to make a trip to a remote Central Office productive. Sending an installer with anything less or even 1 order at a time is seen as a formula for total inefficiency. Single order dispatches are rare as loads are built to include repair and other upkeep work that is generally captured in recurring costs. The default level was determined by Subject Matter Experts with experience in this area.

7) ***Performance Monitoring Testing, Intrusive Test, CPU Time for Registers (Sub-activities in DS3 Interoffice Transport):*** During the provisioning of the DS1 and DS3 Interoffice Transport absolute values have been built in based on first hand experience of a panel of Subject Matter Experts.

13. WORK TIME ESTIMATES

13.0 General

Work time estimates are associated with various activities. The work time estimate is the average amount of time required to perform a particular work function. These work time estimates were obtained from a panel of subject matter experts or other sources and are included in the technical description for each element type.

The estimated work times contained within the *NRCM* incorporate the following underlying assumptions and can be found in Attachment 'C':

- The person performing the work is fully trained.
- All tools, test sets and material are readily available.
- Work operations are based on forward looking technologies and management processes.

14.0 Forward Looking Architecture

14.1 General

A forward looking architecture is the architecture that a firm providing all of the services, that the ILEC provides, would follow if it were to completely reconstruct its network in order to provide all of those services at least cost. The architecture would affect every part of the incumbents network. Within that architecture, the incumbent would install various network components, which would reflect the technology that would provide services at least cost.

Forward looking is a proactive management strategy directed at establishing and maintaining the effectiveness, efficiency and competitive advantage of the telecommunications network in a rapidly changing environment.

A currently available product that is efficient and cost effective is also considered forward looking. An example would be a DSX in a location where there is a minimal requirement for DS1 cross-connects.

14.2 Examples of Forward Looking

Technology	Management
SONET/ADM	Process Focus
DCS / EDSX	Clean/Accurate Databases
IDLC / TR303	Network Administration
Gateway	Robust OSS Interaction
ADTS (Automatic Digital Terminal System)	Process Re-Engineering
Local Digital Switch (LDS)	Root Cause Analysis
Low Profile Frames	Best Practice
DSX (for channelized loop)	All Encompassing Methods and Procedures
SS7 (Signaling System 7)	

15. Efficient Management of Legacy Operational Support Systems (OSS)

15.0 General

The most forward looking architecture for OSS is an architecture consistent with the Telecommunications Management Network (TMN) industry standard. It should be recognized that reliance on existing OSS, rather than TMN compliant architecture, could upwardly bias the cost of certain activities and functions. In other words, OSS that are fully TMN compliant will function best with TMN compliant technology in the Network architecture and vice versa. One can still operate effectively with OSS that are not fully TMN compliant, however, the long run efficiency is enhanced with TMN compliant systems and network.

15.1 NRCM OSS Criteria

The ***NRCM*** OSS are defined by the following criteria:

- Strictly enforced system administration practices that include database synchronization and system release administration procedures such that all databases are updated on a timely basis and are consistent with each other.
- OSS are appropriately sized for optimal user access, network access, other OSS interface access and functional process requirements.
- OSS use front-end edits to minimize the possibility that erroneous information is entered.
- OSS rely on the latest software releases and reside on high availability platforms.

In addition, the environment in which the ***NRCM*** OSS are operated is defined by the following:

- Designed to meet the demands of a multi-carrier environment.
- An environment strategy focused on process management and control.
- To the extent problems occur, the ILEC will pro-actively conduct a proper root cause analysis and will implement changes to eliminate problems.
- CLECs will have access to these OSS via an electronic interface.
- Work throughput is efficiently planned (i.e., POTS and ISDN BRI-type services should not be classified as designed circuits. Such a classification is unnecessary, does not mirror ILEC procedures, and drives up costs.)
- Company personnel are adequately and continually trained on the OSS, processes and network technologies.
- A data communications strategy designed to provide high link and network reliability and survivability.

TMN only compliant systems were **not modeled** for the following reasons:

(1) existing forward looking legacy OSS, when efficiently operated and maintained, provide automated and flow through functionality that is similar in nature to TMN compliant systems.
(2) use of the existing OSS for costing purposes to avoid controversy since some of the existing OSS are not as robust as fully TMN compliant systems and
(3) costs for fully TMN compliant systems are not readily available, and
(4) some legacy OSS can be upgraded to be TMN capable (e.g. OPS/INE).

It should also be noted that while OSS that are fully TMN compliant will function best with TMN compliant technology, efficient technology assumptions are not necessarily all TMN compliant. The older generation of OSS (*i.e.*, pre-TMN architecture) employed by the ILECs are designed to accomplish a "flow-through" ordering process for most orders. By flow-through, we mean that, once the order is issued by the incumbents' service representative, it can traverse the incumbents' various provisioning systems, complete and generate a billing record without the need for any human intervention. To illustrate, flow-through implies that, once the customer service representative releases an order, an automated system then analyzes the order and determines what assignments or updates to outside plant or central office equipment are needed. It also determines whether any local switch translations are necessary. The provisioning systems respond with assignments and the appropriate translations messages. Completion notices are returned to the originating system and stored for future reference. This requires computer processing time only.]

15.2 OSS and INE Flow-Through

Note: Refer to Attachment 'A' for a detailed description of service order provisioning flow.

16. Recovery of Operations Support System Investment

16.0 General

The cost of efficient OSS should be part of the recurring cost of unbundled network elements, and those costs should be recovered in prices for unbundled network elements. OSS themselves are software packages. Incumbent local exchange carriers typically capitalize the first generic of any software acquired with hardware, but expense all later versions of that software. Thus, later generations of legacy OSS should be part of the expenses of the incumbent local exchange carrier. The various TELRIC models of recurring costs use those expense accounts to build estimates of recurring costs of unbundled network elements. Thus, these costs are recovered in recurring rates for unbundled network elements.

The OSS run on various computers. The various TELRIC models of recurring costs use the general purpose computer accounts to build the estimates of recurring costs of unbundled network elements. The computers on which the OSS run are kept operational twenty-four hours per day, so there is no incremental power cost to perform any of these transactional functions. The various TELRIC models use power accounts to build estimates for recurring costs of unbundled network elements. Thus, both the hardware and power costs are recovered in recurring rates for unbundled network elements.

The ***NRCM*** assumes that the costs of the underlying OSS (i.e., hardware, system software, processor costs, updates and upkeep) are recovered in the LEC's recurring wholesale and retail rates.

The underlying OSS are responsible for network provisioning and administration including, but not limited to: additions and rearrangements, recent changes, and performance surveillance. Some of the ILECs' existing OSS may require upgrading and/or modification to allow New Entrants equal access to those systems. These investments are called "transitional" investments and represent the costs to transition the ILECs network from a single-carrier network to a multi-carrier network. These investments can also be called "Competition Onset" investments as they represent the investments that the ILECs must make in their network as a direct result of the Telecommunications Act of 1996. This ***NRCM*** has not modeled these investments as they should be recovered under recurring costs as stated above.

17. DESIGNED VS NON-DESIGNED (POTS & ISDN/BRI) ELEMENTS

17.0 The NRC Model developed the order flows and processes for POTS and ISDN BRI element types based on the assumption that these services are non-designed circuits. This assumption was developed based on the fact that ILECs currently classify their own POTS and ISDN/BRI element types as non-designed circuits. Designed circuits are those types of circuits that are associated with services such as private line.

Some ILECs have incorrectly cost modeled the unbundled POTS or ISDN/BRI loops as designed circuits. This often adds unnecessary conditioning equipment and testing systems (e.g., AD4, D4, or D5, SMAS, etc.). This results in the non-recurring costs becoming much more labor intensive than non-designed services. It also results in overstated NRCs due to processes, work groups, and systems at work centers usually reserved for designed circuits being unnecessarily triggered.

The classification of POTS and ISDN BRI loops as designed circuits also results in "reverse engineering". An example of "reverse engineering" is taking forward-looking technology such as TR-303/IDLC and adding additional equipment which the forward-looking technology was intended to replace, thereby making the forward-looking technology appear obsolete and driving up recurring as well as non-recurring charges.

The use of additional equipment not only drives up the level of investment but also unnecessarily triggers the following:

1. Non-recurring processes such as engineering,
2. Work groups such as CPC, SSC, NTEC, and/or FMAC Centers,
3. Operations Support Systems such as TIRKS and Hekimian HLI REACT Systems/Switched Maintenance Access System ("HLI/SMAS") test shoes.
4. These designs also generate additional unnecessary components which would not normally be required when using forward-looking technologies such as TR-303/IDLC and/or Digital Crossconnect Systems (" DCS/EDSX").

The addition of redundant equipment such as AD4, D4, or D5 Channel Banks, the multiplexing of DS1 to DS0 and subsequent voice-grade interfaces as well as to perform a digital to analog conversion creates more possible points of failure in the network. The multiplexing and conversion (back-to-back hybrids) can introduce echo, glare, delay, noise, and possibly inhibit certain CLASS and Coin features which are all negative customer reactives.. Finally, new entrants will also be required to add redundant additional multiplexing equipment to convert analog signals in order to transport them over the new entrants facilities and terminate on its own Local Digital Switch ("LDS").

Lastly, an ILEC would not design its loop based on the loop assumptions inherent in its cost study because it is cost prohibitive, inefficient and will possibly degrade service quality levels for POTS and ISDN/BRI services. Thus, treatment of design circuits in the cost model is only used for such services and unbundled elements like special services circuits.

17.1 Non-Design Provisioning Flow of an UNE in the ILEC Provisioning Systems

At a very high level, the following is a typical flow of an UNE in an ILEC provisioning process.

Prior to the processing of UNE orders, the collocation equipment is inventoried in the ILEC's SWITCH system. This inventory represents the identity (ID) and MDF locations of the CFA (Connection Facility Assignment) connections. The provisioning systems (SOAC) must be taught to recognize the FID and location data from the service request, and pass this information on to the appropriate systems (SWITCH, TIRKS, NSDB, etc.).

In the case of a UNE-Loop service request, SOAC would recognize that this service request is non-design (by the fact that there is no Control Section in the request) and send an assignment request to the loop inventory system (LFACS) indicating service location and service type (service type is derived by Class of Service and USOC's). The LFACS system responds by assigning the appropriate outside plant facilities (i.e. cable pair). This information would be passed to the SWITCH system where it would be processed. The telephone number (CLEC assigned) does not belong to the ILEC nor does it appear in the wire center of the outside plant facilities, so no office equipment would be assigned. The SWITCH system would know to assign a cross-connection path from the cable pair to CFA terminal equipment based on the information contained in the service request (FID data representing CFA location). This information is assembled and returned to SOAC which in turn forwards it to the work force administration system that directs technicians to place the actual crossconnects.

In the case of the UNE- Port service request, SOAC would determine that outside plant facilities are not required (USOC shows no LFACS involvement) and forward the request only to the SWITCH system. Since the telephone number is ILEC involved, the SWITCH system would assign a port based on the USOC's in the service request. The SWITCH system would also assign the cross-connection from the MDF port appearance to the CFA location based on the information in the service request (FID data representing the CFA location). This information is assembled and returned To SOAC which in turn forwards it to the work force administration system that instructs the technician to place the actual cross-connection, and also forwards this information to the Recent Change Memory Administration Center system (March etc.) for service (switch) translations.

A complete flow through process, that assigns Foreign Exchange (FX) service requests, are handled by ILEC provisioning systems today. The systems will assign loop facilities in one central office location on the service request and office equipment in another central office where the telephone number originates.

This type of service request is normally a designed service (Special) because inter-office facilities must be assigned by TIRKS. The service request must have a Control Section to indicate that it is a Designed Service request thereby forwarding information to the TIRKS system. The TIRKS system would construct a path of interoffice facilities between central offices.

When a service requests does not contain a Control Section, SOAC will not forward the request to TIRKS and it becomes a non-designed service request. CLEC POTS type service requests for UNE's do not need a Control Section nor do they need to have TIRKS involved. Information regarding the CLEC's collocation connection information can be processed by the SOAC and SWITCH systems to avoid costly design processes.

Note: Advantages of CFA in the ILEC's SWITCH/COSMOS systems: When the ILEC inventories the CLEC CFA information, service request processing will insure that the CFA ID is available for assignment. In the event where a CLEC assigns an CFA designation that is not available, the SWITCH system can produce an error message indicating that it is not able to complete assignment. This RMA could be recognized by PAWS and electronically forwarded to the CLEC for resolution.

17.2 Designed 4-Wire Loop Exception

The exception to non-designed loops is the 4-wire loop (analog or digital) which by its very nature, constitutes a designed service/circuit. If the 4-wire loop serves the end-user from the same CO or wire center, SMAS test points are modeled with the appropriate 4-wire crossconnects.

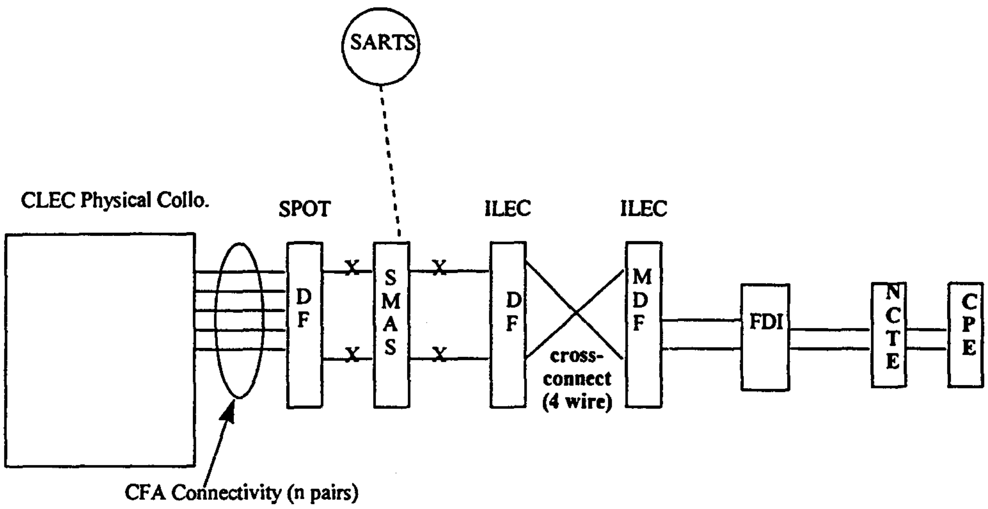
If channel banks are a necessity, as is the case of a 4-wire loop (analog or digital) served from a different CO or wire center than the end-user is currently served from (or physical collocation in a different wire center), a forward-looking automated D4 such as an AD4 or D5 Automated Digital Terminal System (ADTS[8]) should be assumed These are considered Processor Controlled Network Elements (PCNE), as they support multi-function channel units, and can be provisioned, monitored, tested, and inventoried from upstream ILEC legacy OSS systems. In this scenario, the SMAS points are assumed to be unitized with the associated maintenance-connectors and cabling hardwired into the AD4, D4, or D5 seven (7) foot or eleven (actually 11'6") foot bays (see schematics below)

As a result of a designed service, the upstream OSS systems (e.g., TIRKS/FEPS) and appropriate work groups (e.g., NTEC,) are also assumed. *Finally, in the above scenario (different CO), the multiplexed (to DS0) DS1 and associated Multiplexer (D4, AD4, D5, etc.) is considered to be a DS1/DS0 Transport element.*

<u>4-Wire Loop (Same CO)</u>

8 ADTS requirements and objectives can be found in Bellcore's TR-TSY-000174.

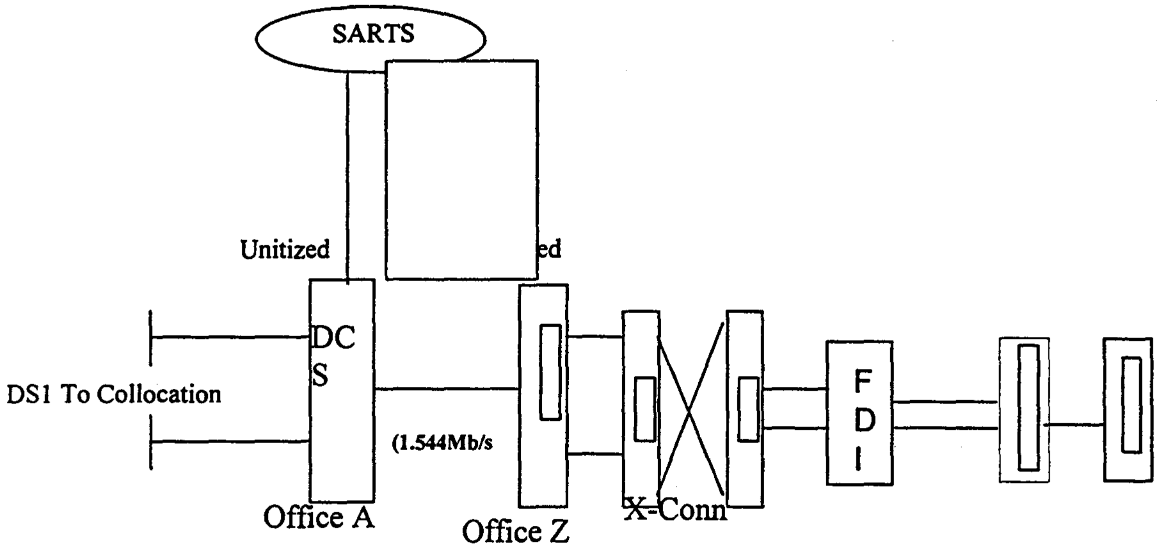
4 Wire Unbundled Copper Loop



18. Dedicated Facilities

18.0 General

DIP (Dedicated Inside Plant) refers to the Central Office and is the cross connect of a cable pair to a line equipment (line side port or originating equipment (OE)) or to a *point* cabled to the collocation area of a new entrant). The *point* (sometimes called an CFA, Tie Cable Pair, or other) is a location on a frame that is cabled permanently to a collocation. DIP is simply when the line equipment or CFA and cross connect in the Central Office is left in place after the end user service has been deactivated, suspended or terminated.



DOP (Dedicated Outside Plant) refers to the station wire and cable facilities to the central office. All lines presently in service (100%) are DOP candidates. Choosing not to implement DOP for all facilities or only on a selected basis is a business decision which is made with a clear understanding of the costs associated with the decision. If the facilities don't exist, then once they are constructed, the costs of which are recovered under recurring costs, they become eligible for DOP.

18.1 NRCM Treatment of DIP and DOP

The NRCM assumes 100% DIP/DOP as the forward-looking practice; as labor costs rise and equipment costs decline, it is typically most efficient to leave connections in place for future reuse, thereby avoiding the labor costs involved in dismantling and subsequently reconnecting the facility to the same customer premises. Thus, once a cross-connect is in place, DIP/DOP is created and will normally remain undisturbed as long as service is provided to the specific customer *premises*. Thus, the cost of initially creating DIP/DOP is part of the initial investment in the network, and is correctly recovered through recurring charges.

Some ILECs, however, have claimed that even if DIP/DOP is the efficient forward-looking practice, there will be circumstances in which cross-connect work is still required, i.e., where DIP/DOP is not in place, in order to complete a particular customer order. They argue that in such circumstances the associated expenditure is correctly treated as an NRC rather than as a recurring cost. This position is, however, not correct.

Cross-connect work may be required for "first time" provision of service at a particular premises or where (for whatever reason) the facilities dedicated to that premises are not sufficient to meet the specific inward service requirement. Once completed, however, the DIP/DOP that is created as a result of that cross-connect work will (or can) remain in place even after the initial customer leaves, and so is (like preexisting DIP/DOP) recoverable over the *location life* rather than over the *service life* for the original customer.

The decision to pre-construct DIP/DOP, to leave existing DIP/DOP in place when a customer discontinues service, or to make cross-connects on an individual basis in response to specific service orders reflects economic trade-offs that are not specifically tied to any individual inward service order activity. For example:

- Where a new multi-unit building or subdivision is being constructed, the most economical provisioning strategy may well be to pre-construct and pre-connect all units in the building or complex. However, where facilities are required to provide service in an existing community, the most efficient strategy may well be to make the required connections at the time that the order for service is received. The selection of the efficient strategy in each situation will clearly affect the total investment required, and hence the recurring cost, but is in no sense *caused* by a specific service order *even if the arrival of the service order happens to be the triggering event.*

- An ILEC will decide on the number of pairs to deploy to each residential unit in a particular distribution system based upon projections of demand for additional residential access lines. If a relatively high demand is anticipated, the efficient construction strategy may be to dedicate two (or even more than two) pairs to each unit, rather than to cross-connect from a pool of pairs when a specific unit requests an additional access line. The break-even point will depend upon the relative cost of initial placement and dedication of multiple pairs vs. the per-order cost of creating the necessary cross-connects. If additional line demand is, for example, 15%, then the first (DIP/DOP) strategy may be most efficient; if the demand is only 2%, then the cross-connect strategy may be most efficient. In either case, the choice affects the average investment per additional access line, and has no bearing upon nonrecurring cost. Suppose that in a subdivision consisting of 1,000 residential premises the incremental cost of placing (at the time of initial construction) one additional dedicated pair at each residence is $10, but that the incremental cost of the cross-connects and associated testing required in order to provide a pair from a pool of spare pairs is $100. Under the DIP/DOP strategy, the incremental cost would be $10,000 (i.e., $10 x 1,000 premises). If second line penetration is 15%, then under the cross-connect strategy the provisioning cost would be $15,000 (i.e., $100 x 1,000 units x 15%), so the DIP/DOP approach would be most efficient. If, however, the expected penetration will be only 2%, the cost would be $2,000 (i.e., $100 x 1,000 units x 2%), making the cross-connect approach most efficient.

The fact that work may happen to be triggered by the arrival of a service order does not necessarily imply that the cost was *caused* by the service order. A new hotel might open for business before all of its furniture has been delivered. During the initial ramp-up period, it will need to make sure that furniture is in place in a specific room the first time that room is to be rented. However, merely because the furniture is acquired and moved into the room just before the first guest arrives (the triggering event) does not mean that this guest should be expected to pay the entire cost of the furniture.

The NRCM applies a slightly different treatment with respect to cross-connect costs associated with UNE-loops. Here, the NRCM treats as *nonrecurring* the costs of connecting a specific loop to the CLEC's collocation space. There is, however, no inconsistency between the treatment of UNE-loops and ILEC end user services. In the case of the UNE-loop, the *customer* is the CLEC, and the cross-connect between the ILEC's MDF and the CLEC's collocation space will remain in place only so long as the CLEC retains the same UNE-loop in place (although more than one CLEC end-user subscriber may be served over time from this same loop facility). Because the cross-connect needed to connect the UNE-loop to the CLEC's collocation space is specific to the CLEC as the *ILEC's customer*, it is appropriate that this cross-connect cost be recovered from the CLEC as a one-time charge, which is what the NRCM contemplates. Note, however, that from the CLEC's perspective, such costs represent its own network build-out investment, and may properly be recovered by the CLEC from its customer as a recurring cost.

19. Connecting Facility Assignment (CFA)

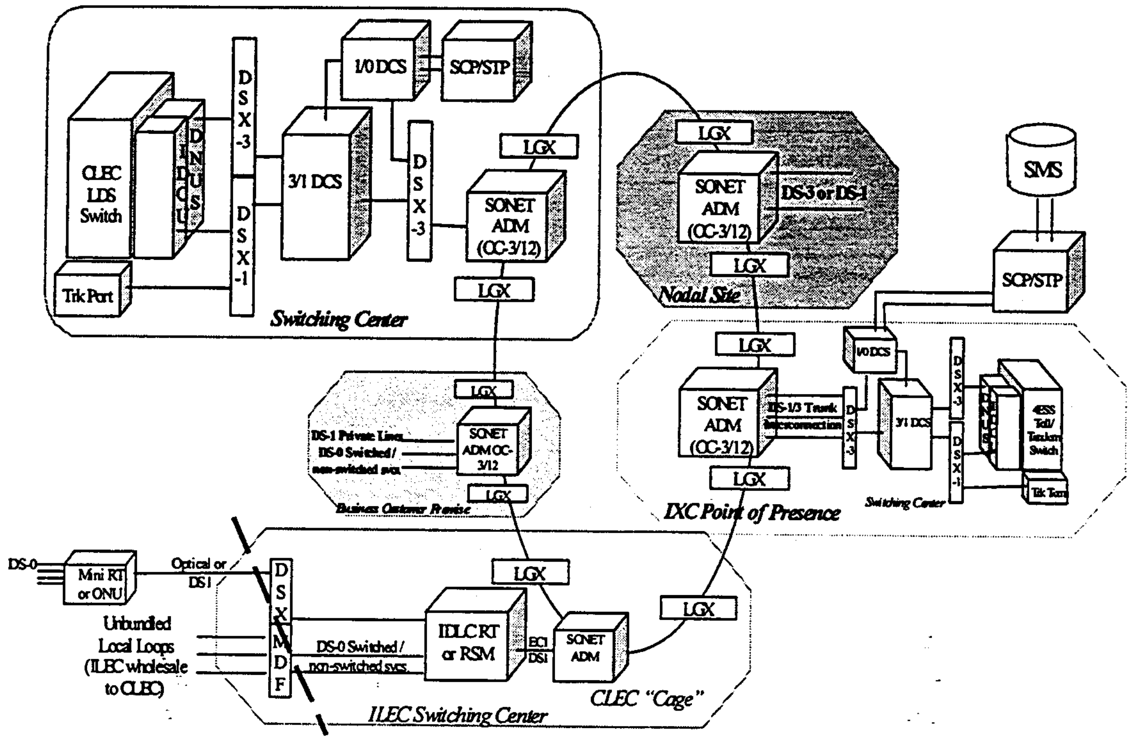
19.0 General

All DS1, DS3, DS0, and Fiber Connecting Facility Assignments (often referred to as Connecting Facility Assignments [CFA's] or Expanded Interconnection Channel Terminations [EICT]). The maximum design distance limitations for DS1 and DS3 CFAs are 650 and 450 feet respectively. These distances are rarely exceeded due to the additional equipment required (e.g. repeaters, amplifiers, regenerators, etc.) and associated economic penalties as well as the high potential for service impairment. The FCC has already determined that "...it is unreasonable for the LECs to charge interconnectors for the cost of regenerators in a physical collocation arrangement as most cabling arrangements can be established such that distances do not require the application of regenerators for physical collocation service" - FCC 97-208 June 13, 1997, Physical Collocation Tariff Investigation, Para. 117. Also see Bellcore Technical Publication TR-440 (TSGR), and ANSI T1.403.

In the same report, the FCC concluded that the charges for regeneration should be excluded. The FCC reasoned that the ILECs control the collocation design and resultant cabling routes and lengths, and have the ability to control whether regeneration devices are required. Thus an ILEC, if allowed to charge for regeneration, would not have the incentive to locate competitors in the most efficient location available and it would allow the ILEC to discriminate against its competitors. (See exhibit below for detailed schematic of network architecture, CFA, and physical collocation).

19.1 Generic Network Architecture with Physical Collocation

Network Architecture With Physical Collocation



20. Testing

20.0 General

This section addresses both POTS and Special Service testing issues. Currently, ILECs maintain and test POTS subscriber loops using the Mechanized Loop Test System (MLT) which performs an intrusive test and is a reactive test. When a customer reports a trouble, the ILEC uses MLT and the functionality of the local digital switch (LDS) to access the local loop and isolate troubles (i.e., determine whether the problem is located inside or outside the central office (on the line or in the customer's equipment). Under the UNE-Loop entry scenario however, the ILEC loses the ability to remotely access the loop because the ILEC's switch is no longer attached to the loop. This Model has assumed that once a loop (2-wire TWP or TR-303) is connected to a new entrant's switch and is in service, the new entrant will be responsible for ensuring that the loop is functioning properly. The new entrant will test the unbundled loop with its own appropriate Operational Support System (i.e. MLT and Predictor/ALIT) and coordinate with the ILEC to clear any problems identified.

The Model recognizes and accounts for testing, some of which is automated, as appropriate.

20.1 Basic Testing (used for POTS and ISDN/BRI services)

- Mechanized Loop Testing (MLT) which is a reactive POTS test based on customer (reactive) report.
- Predictor Automatic Line Insulation Test (ALIT) which is a proactive performance test on the customer's loop to be aware of potential failure before they occur. This is a Recurring Cost - ongoing expense on existing plant in place.
- Switched Maintenance Access System (SMAS) or REACT (includes Test Shoes) are not appropriate for 2-Wire Unbundled (non-designed) loops.
- ISTF is inherent in the LDS Switch, and is used for testing ISDN/BRI.

20.1.1 ILEC Pro-Active vs. Reactive Loop Testing

For the TSR and UNE-P only, entry scenarios, this model assumes that all maintenance type reactive testing will be performed by the ILEC . Costs associated with this testing is recovered under the recurring rates.

The UNE-Loop entry scenario is more complicated. It is also assumed that the ILEC has turned on their proactive Predictor / ALIT Proactive Monitoring System in order to be aware of potential loop problems and fix them before they fail.

20.1.2 UNE Copper Loop Predicator / Automatic Line Insulation Test (ALIT) - Proactive Testing

Prior to the loop being migrated to the New Entrant, the ILEC should have been using their Predictor/ALIT (Automatic Line Insulation Test) loop proactive performance monitoring system which detects some problems in the end-users loop usually before they are reported by the end user. These tests are proactive and are recurring in nature.

20.1.3 UNE Copper Loop Mechanized Loop Testing - Reactive Testing

MLT is used as a reactive (not proactive) test system that is based on an end-user customer reporting trouble on their line. Therefore, MLT should not be used to test the loop before it is migrated since it is assumed that it was already working and being proactively monitored by Predictor/ALIT. It should be noted that the New Entrant would also use MLT and ALIT as part of their OSS and Network Operations Infrastructure

20.2 Special Services Testing

It is assumed that special service circuits will be tested prior to "turn-up". These costs have been accounted for in the *NRCM*. These tests are used to maintain designed private line and special service circuits. Specialized testing system assumes that loops are complex circuits, and thereby typically require the following:

- Connection to Hekimian REACT/HLI or Switched Access Remote Tests System (SARTS)/ using the Switched Maintenance Access System (SMAS)
- Circuit numbers assigned to elements for record keeping and status tracking
- Additional work-time to connect Switched Maintenance Access System (SMAS)
- Conditioning equipment (i.e. AD4, D4, or D5 Channel Banks)
- Installers are dispatched to customer premise to ensure circuit continuity and proper transmission characteristics of the complex circuit
- A Work Order Record Detail Document (WORD) from TIRKS, which assigns the necessary circuit design characteristics, must be completed manually (non flow-through)
- Manual coordination of work-force activities.
- Different (higher paid) technicians than those who perform similar (non-designed circuit) work activities for the ILEC.

20.2.1 Special Services Reactive Testing (SMAS, Test Shoes, REACT/HLI)

This Model has assumed that testing for Special Services will be performed by the ILEC using the Specialized Testing process called Hekimian (HLI) REACT or Switched Access Remote Test System/Switched Maintenance Access System (SARTS/SMAS) via test shoes or otherwise. These systems were designed primarily for testing *Special Service Circuits* to enable a single test person, usually in a centralized Special Service Test Center (SSC), to test, sectionalize and isolate troubles on complex or special service circuits that usually transverse multiple central offices.

SMAS connection points are placed between each of the pieces of transmission and / or conditioning equipment giving a tester the ability to isolate the problem by inserting test signals at the SMAS connection point and monitoring the transmission at the other SMAS points on the circuit. Typically during testing, a test signal is introduced at one SMAS point and it is then compared to the expected result at another SMAS point.

Under the UNE-2 wire Loop scenario, the only way to use SMAS would be to introduce the SMAS access at only one point of the circuit.

This model has therefore assumed that the new entrant will be responsible for the customer's loop once the customer is terminated on their switch. Problems reported by the customer could be verified and located using the new entrant's MLT system. If the problem was in the new entrant's equipment the new entrant would repair it. If the trouble was determined to be outside of the new entrant's local switch and collocated equipment it would be referred to the ILEC. Any other information that would be required by the ILEC could be obtained from the new entrant's test center.

20.2.2 Exceptions to Special Services Reactive Loop Testing (SMAS)

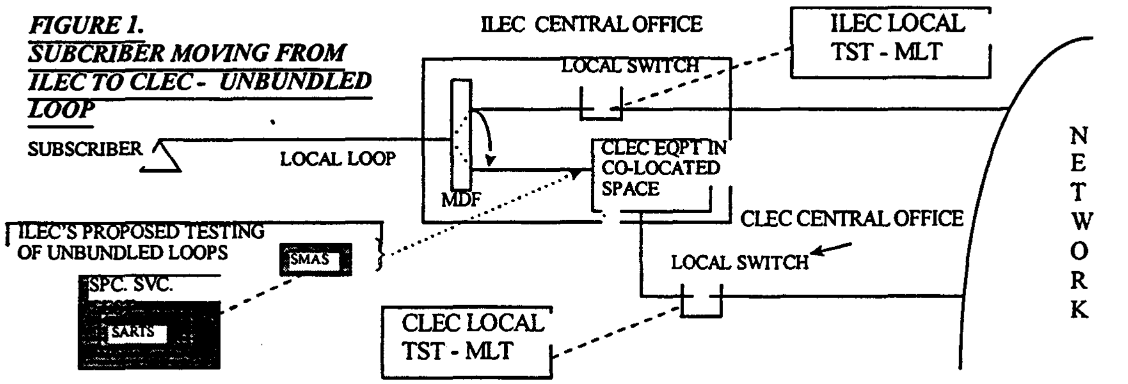
Since AT&T and MCI recognize 4-wire digital and analog copper loops are designed type services, stand-alone SMAS test points were modeled, which require additional cross-connects terminated on the test points, which are typically located on an equipment toll frame. In the case of a different CO than the end-user is served from, the SMAS points are considered to be Unitized on D4, D5, or AD/4 Channel Banks.

These Maintenance Connectors therefore require no additional cross-connects. *Finally, in the above scenario (different CO), the multiplexed to DS0 - DS1 and associated Multiplexer (D4, AD4, D5, etc.) is considered to be a DS1/DS0 Transport element.*

20.2.3 SMAS Technical Description/Flow

The Lucent Technologies Switched Access Remote Test System/ Switched Maintenance Access System ("SARTS/SMAS") and/or REACT/HLI system is deployed today in most RBOC companies and is not intended to be used for testing non-designed POTS type loops. This system was designed primarily for testing <u>Special Service Circuits</u> to enable a single test person, usually in a centralized Special Service Test Center (SSC), to test, sectionalize and isolate troubles on designed or special service circuits that usually transverse more than one central office.

FIGURE 1. SUBCRIBER MOVING FROM ILEC TO CLEC - UNBUNDLED LOOP



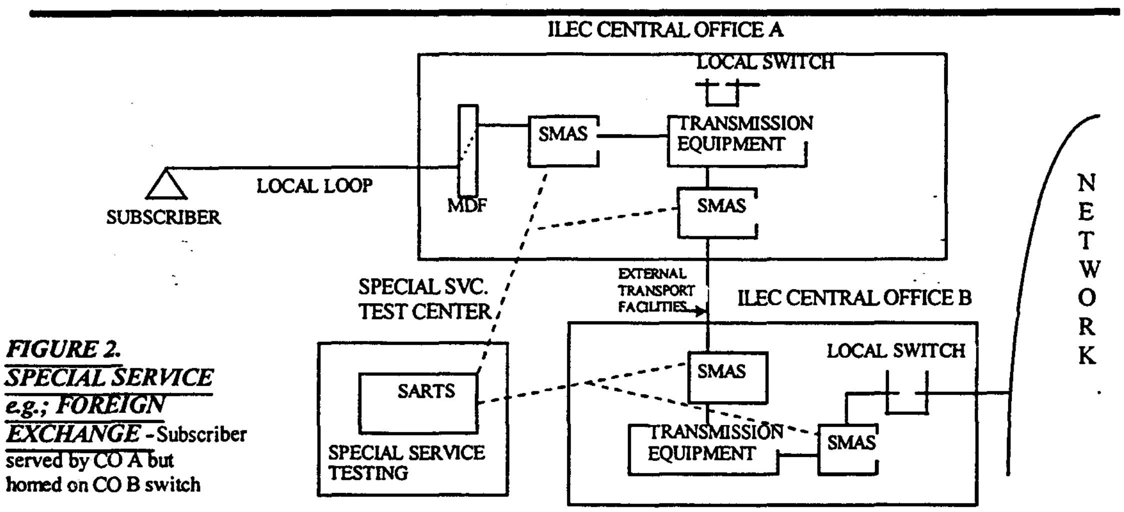


FIGURE 2. SPECIAL SERVICE e.g.; FOREIGN EXCHANGE - Subscriber served by CO A but homed on CO B switch

Figure 2 above depicts a technical schematic of a SMAS/SARTS test system. The special service circuit depicted here shows a customer or subscriber that is physically located in an area that would normally be served from one central office, actually receiving dial tone and being served by a switch in another central office. You can trace the circuit path from the subscriber location through the MDF, SMAS and Transmission Equipment in Central Office A through the external transport facilities into Central Office B where it terminates on that switch after passing through the SMAS and Transmission Equipment in that office (Note that there is no connection to the switch in the first office.).

If you compare this circuit with the simple case in the first figure (figure 1) of a subscriber's loop terminating on the serving central office switch, the first thing that becomes apparent is the distance that has to be traveled before the subscriber is terminated on the switch. In order for the circuit in Figure 2. to operate properly, additional equipment is necessary to enhance both the signaling and transmission that takes place between the subscriber and the serving switch to compensate for the extended distance that has to be traveled. That equipment is depicted as the transmission equipment in Figure 2.

If the subscriber experienced a problem in this scenario, there could be many potential causes for the problem; it could be in the subscriber's equipment, the local loop, the transmission equipment in either of the two offices, the external transport facilities, or in the switch in the serving office. This circuit is depicted as only passing through two offices but there could have been additional intermediate offices before it reached its final destination. It is very obvious that sectionalizing or isolating problems in this case would be difficult and very time consuming.

The SARTS/SMAS System and/or REACT/HLI system gives a single tester the ability to isolate a trouble on this type of circuit. This is accomplished by inserting a SMAS connection between each of the pieces of equipment that are used to enhance the signaling and transmission of the circuit. SARTS/SMAS and/or REACT/HLI system gives a tester the ability to isolate the circuit at particular points by inserting test signals through the SMAS connection and monitoring the transmission to other SMAS points on the circuit. During testing, a test signal is introduced at one SMAS point and it is then compared to the expected result at another SMAS point. This process continues until the problem is isolated. The SARTS/SMAS System and/or REACT/HLI system enables one tester to accomplish this task and eliminates the need to coordinate this process with personnel in each office which would have to take place if this capability did not exist. As is evident from this brief overview, the benefits of using this specialized test system occur when it is used for testing circuits that traverse multiple pieces of equipment across many central offices in an extended geographical area.

20.3 Loop Verification Prior to Cut-Over (Migration) to the New Entrant

This model assumes that – for copper loop migration – on the due date of cut-over, the technician would conduct a verification test by checking for dial tone, verifying the circuit is not traffic busy (voice or data), and conducting an automatic number identification (ANI) on the existing loop in order to verify that it is the correct circuit to be migrated. In addition, a continuity test would also be conducted on the new entrant cross connect (from the CLEC LDS via the CFA cross-connect) in order to verify dial-tone and correct telephone number (ANI) from the new entrant's switch so as not to have the end-use customer without service.

20.4 Testing via EDSX/DCS

20.4.1 Reactive Testing and Proactive Performance Monitoring (PM) via EDSX/DCS

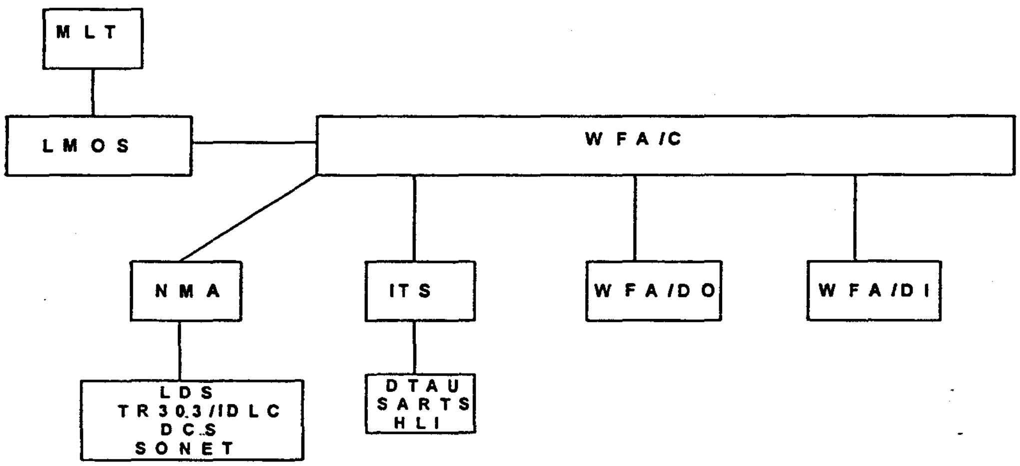
If one assumes the most forward looking technology using electronic digital signal cross-connect system/digital cross-connect system ("EDSX/DCS"), the remote OSS proactive tests using performance monitoring ("PM") registers on the DCS would be set/scheduled to autonomously report errors at the crossing of a time and/or error threshold. If the performance monitoring test fails, then remote OSS reactive tests would be performed using the remote DTAU test access also resident on the DCS and accessed via a testing operations system ("TOS"). This assumes that test access/facility access (TAD/FAD) Di-groups are grown for test access. Finally, it should not be required to dispatch a technician to the central office ("CO") in order to set up DS1 test gear at a DSX, but rather performed remotely from the Facility Maintenance Administration Center ("FMAC") or similar work center with the DCS/EDSX being accessed remotely.

20.5 DS1 and DS3 Testing

The following testing assumptions for all DS1 (DS1 transport, DS1 loop, DS1 signaling links; DS1 channelized, etc.) and DS3, were made:

In a forward looking environment, it is assumed that for purposes of a "keep alive" signal equivalent to a basic continuity test, that an external quasi-random signal source - QRSS (QRSS) or PRSB15 is connected to the DS1 or DS3 respectively via the remote TOS/ITS connected to the FAD/TAD DTAU access of the EDSX or DCS. Furthermore, it is assumed that Network Fault and Performance Management OSS Systems such as Bellcore's NMA system have the capability (based on scripts, parse-rules and templates) to receive both scheduled and or unsolicited/autonomous alarms (reactive) and/or performance monitoring (proactive) messages from the Intelligent Network Elements (e.g., LDS, SONET, DCS/EDSX, IDLC, IDLC/TR-303, ADTS, etc.) and generate and propagate trouble tickets to the Work Management Systems (e.g., WFA). The tickets are then correlated and stapled. Based on customer data obtained from the network and services databases, WFA then has the ability to send a test request to the testing operations system (e.g., ITS), which then makes an intelligent decision on the test system controller (TSC) or remote test head (RTH) resources to use. Examples of such resources include, but are not limited to SARTS/SMAS, DTAU, HLI, RMS-DS1, etc. The aforementioned process takes place automatically, without need for manual intervention. Once ITS completes its test, it will then make a decision to dispatch-in via WFA/DI (e.g., FMAC work force) or dispatch-out via WFA/DO (e.g., SSI&M work force)

(Note: References on testing and surveillance can be found in GR-834-CORE, FR-476, FR-475, GR-820-CORE, GR-833-CORE, TR-TSY-000821, and FR-473 of Bellcore's FR-439 Operations Technology Generic Requirements (OTGR)[9].



21. Disconnect / Service Deactivation

21.0 General

New Entrants should not pay for disconnecting a loop when they subscribe to an unbundled loop. **New Entrants should only pay to disconnect an unbundled loop when they order *"the loop"* disconnected.** Requiring an entrant to pay for disconnection at the time it orders a connection violates cost causation, as the costs for disconnection are not incurred until or unless a facility is disconnected. Indeed, it is questionable whether end users should pay for disconnecting at the time

[9] References on testing and surveillance can be found in GR-834-CORE, FR-476, FR-475, GR-820-CORE, GR-833-CORE, TR-TSY-000821, and FR-473 of Bellcore's FR-439 Operations Technology Generic Requirements (OTGR)

they order the service, as the facilities are rarely disconnected any longer. It is certainly the case, however, that New Entrants should not pay for a disconnect unless they order the facilities disconnected.

The rationale for charging for disconnect at the time the end user orders service is that the end user might not pay a disconnect charge when he or she calls to cancel the service (especially if the service was terminated unwillingly). A New Entrant, however, must maintain its standing with the incumbent or go out of business. Only if and when the New Entrant asks the incumbent to disconnect the facilities should a disconnect charge be assessed, and not before. This makes the disconnect charge follow the principles of cost-causation.

21.1 Disconnect within the NRC Model

The costs of disconnect activities are modeled as separate scenarios. Disconnect costs were modeled separately to allow the new entrant the ability to either retain the Dedicated Inside Plant ("DIP") and Soft Dial Tone ("SDT") or disconnect the copper connection. Maintaining DIP and DOP as well as Soft Dial Tone (SDT) is at the discretion of the New Entrant. Maintaining SDT will also allow for competitive balance. If a CLEC customer leaves a location and the circuit reverts to ILEC SDT, the CLEC will lose Business Office access to the opportunity to secure the next occupant moving into the vacated location. In a forward looking environment where DIP and DOP are implemented, 'de-activation' is the correct term for non-designed element types.

This model design assumptions were developed to identify separately, installation from disconnection costs. While an ILEC[10] has typically modeled the installation charges to include the disconnection costs, this model separates these activities for costing *and* pricing purposes. The rationale for this method is as follows. First, it recognizes that the ILEC should only receive the revenue for the disconnect at the time the actual disconnection occurs. This eliminates a "time value of money" concern that is inherent in the current ILEC methodology. This will also aid in the better matching of costs incurred with the revenues received.

Second, the desegregation of the costs and prices also allow the new entrant the ability to continue long standing and efficient practices called Dedicated Inside Plant ("DIP") and Dedicated Outside Plant ("DOP"). The DIP and DOP process also allows for rapid activation or deactivation of services at an end user location without the need for physical disruption of the facility. In that, a command from the OSS to the switch will either activate or de-activate the service. When a customer changes location, the existing facility is not impacted. While there are occasions where the physical plant is disconnected[11], from a scorched node perspective, this would not occur. Thus, by modeling the installation separately from disconnect, the new entrant would have the same benefits from the DIP and DOP as well as Soft Dial Tone (SDT) processes as would the ILEC.

Third, the ILEC has the ability to maintain a soft dial tone connection at premises of former customers. To prevent discrimination with regard to this competitive advantage, CLECs should also have the option of maintaining warm dial tone at the premises of their former customers while continuing to absorb any element costs in place. The payment of any disconnection cost, either at the time the service was originally established or at this time, with no physical work being requested, is not valid.

21.2 Retail Disconnects

10 Some RBOCs model their retail and wholesale non-recurring charges to include both the installation and disconnection costs.

11 Sometimes referred to as "breaking connect through"; many times due to lack of facilities.

The disconnect is accomplished electronically through a class of service change in the switch. This change either denies service or provides 'soft' dialtone. The only realized cost is that of the service order activity.

21.3 Wholesale Disconnects

21.3.1 Customer Migration (TSR & UNE-P)

Typically, when a CLEC wins a customer from the ILEC, the transfer of service is accomplished by the CLEC through a gateway. It should be noted that if the ILEC is successful at winning a lost customer back, the ILEC should absorb the cost of the transfer (service order activity) just as the CLEC did when they won the customer from the ILEC.

21.3.2 New Customer (TSR & UNE-P)

When a new customer is established, the CLEC pays the ILEC the appropriate NRC which should NOT include any cost for a future disconnect. If the customer disconnects service with the CLEC, the retail disconnect costs, as well as any cost to disconnect from the ILEC facilities, would be incurred by the CLEC and recovered from the end user customer in a final billing,
similar to the process applied by other utilities. This aligns with the causal cost approach. If the ILEC wins the end user from the CLEC, then the ILEC can determine if they want to charge the end user a disconnect charge at that time.

21.3.3 Customer Migration (Unbundled Loop)

The cost of migrating a customer (i.e., disconnect the jumper from the ILEC switch and reconnecting it to the CLEC terminal using the same facilities) is covered by the NRC. When this end user vacates the location and disconnects service from the CLEC, the connections and facilities should, at the option of the CLEC, stay in place so that 'soft' dial tone can be provided. Thus, no disconnect charges from the ILEC should apply and the CLEC will continue to pay recurring charges as before. The CLEC will establish any soft dial tone features on its switch.
The ONLY time a disconnect charge by the ILEC is appropriate is when the CLEC issues a service order to physically disconnect the circuit.

21.3.4 New Customer (Unbundled Loop)

The same conditions apply in the customer (Unbundled Loop) as those for customer migration (Unbundled Loop) described in paragraph 3.2.4.

22. Loop Unbundling

22.0 General

Loop unbundling is where a new entrant uses a portion of the loop plant (i.e., either the feeder or the distribution).

22.1 Detailed Description

The first four network elements comprise what is commonly referred to as the "loop". The loop provides a transmission path between the subscriber and his or her local serving wire center. The loop elements are illustrated in Figure 2 below.

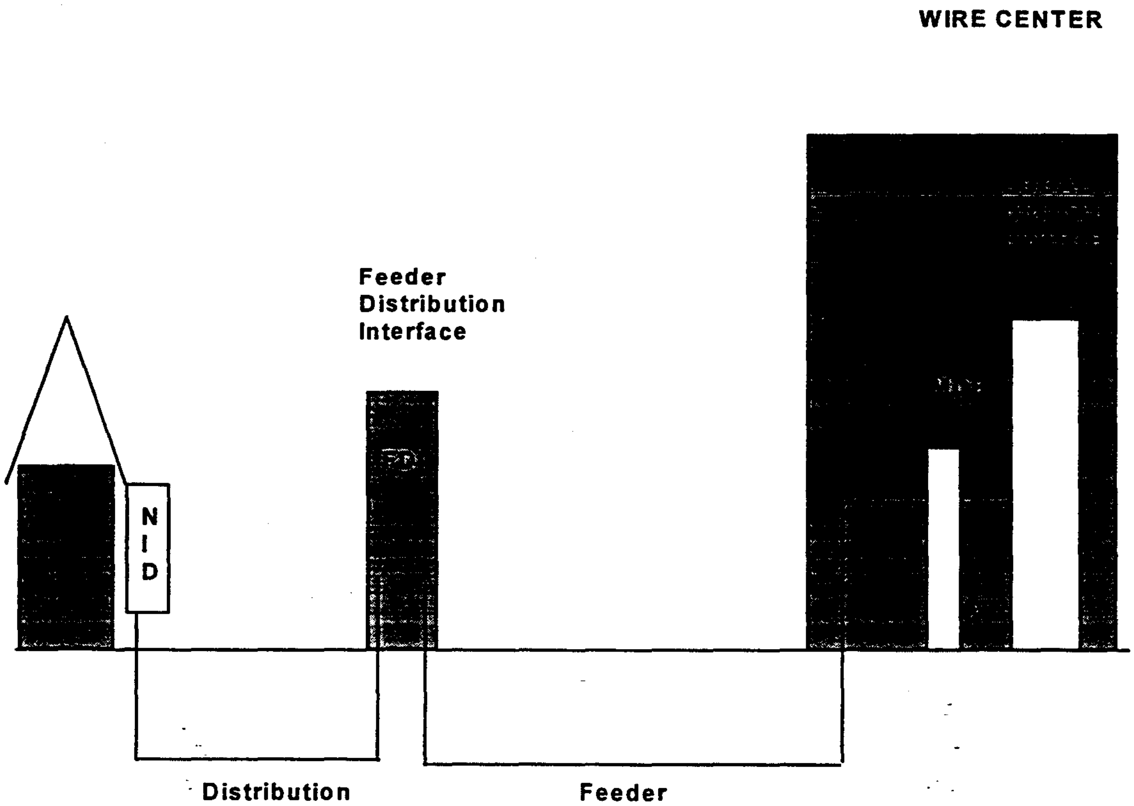


Figure 2 - Loop Elements

a. Network Interface Device - The NID, illustrated in figure 3, is a single-line termination device or that portion of a multiple-line termination device required to terminate a single line or circuit. The fundamental function of the NID is to separate the customer's facilities from the carrier's facilities.

Network Interface Device (NID)

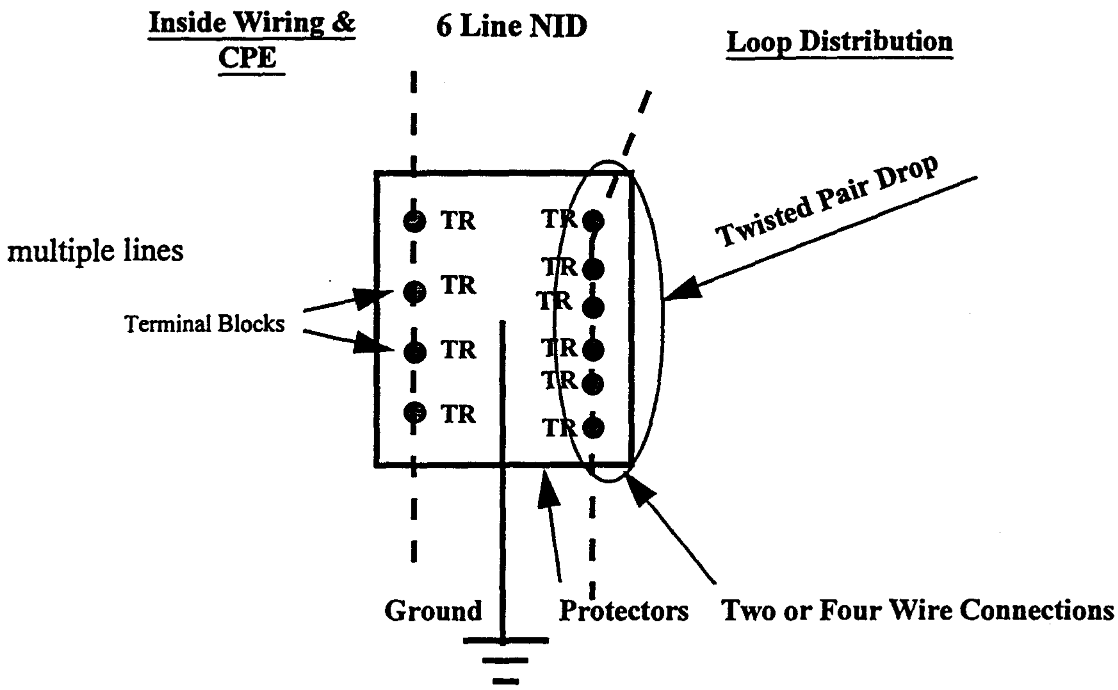


Figure 3 - Network Interface Device

b. Loop Distribution - Loop Distribution (typically a pair of copper wires) connects the customer's premises to the equipment that joins loop distribution facilities from multiple subscribers. It accomplishes this by connecting the NID and the terminal block on the customer side of a Feeder Distribution Interface ("FDI"). The FDI terminates the Loop Distribution and the Loop Feeder and cross-connects them in order to provide a continuous transmission path between the NID and a telephone company central office. The Loop element is illustrated in Figure 4

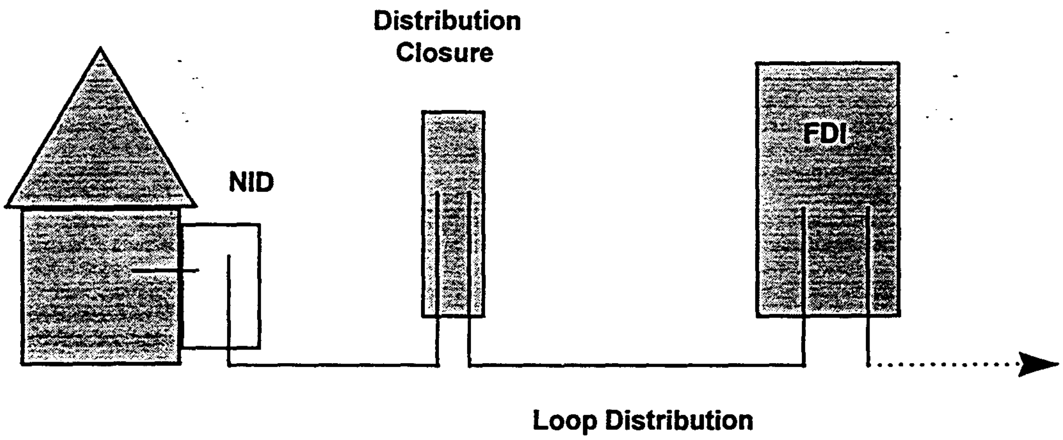


Figure 4 - Loop Distribution

c. Loop Concentrator/Multiplexer ("Mux/Con") - The Mux/Con multiplexes and concentrates traffic generated through the individual loop distribution facilities serving numerous customer locations. The concentrator function enables an ILEC to deliver traffic between the Mux/Con and the local end office at higher data speeds, using more cost-effective loop feeder facilities. The Mux/Con also dis-aggregates traffic coming over the Loop Feeder facilities from the ILEC's switch, so that calls can be directed to individual end users over the Loop Distribution plant. The Mux/Con network element is illustrated in Figure 5 below.

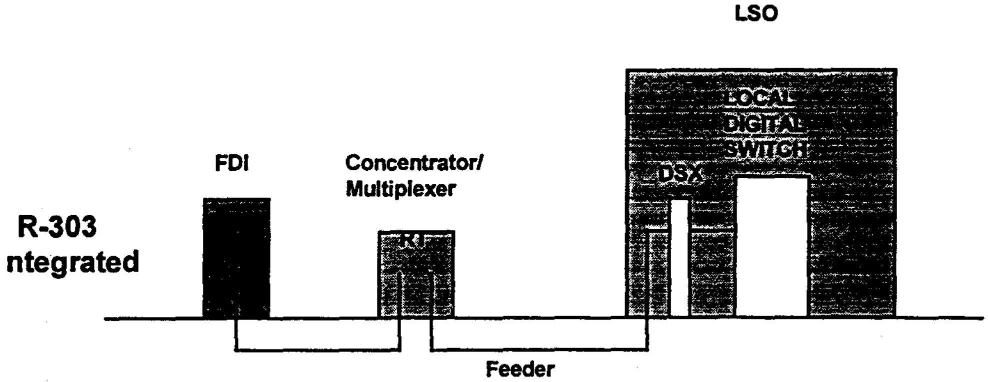


Figure 5 - Loop Concentrator/Multiplexer

4. Loop Feeder - The Loop Feeder transmits the aggregated traffic from many Loop Distribution facilities to a central office.

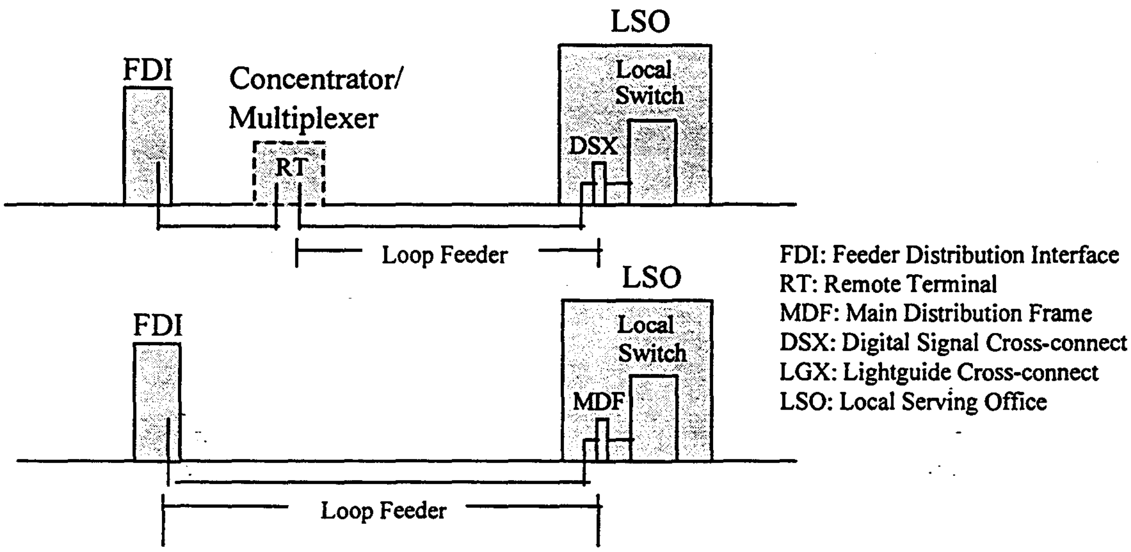


Figure 6 - Loop Feeder

23. Transport Inter Office Facilities (IOF)

23.0 General

Inter Office Facility (IOF) is the facility between Central Offices (CO), between a CO and a Point of Presence (POP) or between a POP and another POP (e.g.; toll switch. The facility (DS0,1,3) can be physical or virtual.

That SONET ring and DCS technology consistently proves to be financially advantageous in Interoffice Network planning models and cost studies is supported by its widespread deployment by all of the ILECs. In addition, the features provided by these products include robust survivability, automatic restoration, remote management and provisioning functions and lower implementation costs.

Performance Monitoring (PM) and alarm thresholds can be embedded in the system software load when purchased from the vendor or set on a system wide basis during the commissioning and acceptance process. There is no need to perform these activities on a labor intensive, circuit/port basis.

An FMAC staffed by highly trained technicians to survey and control all designed IOF transport facilities reduces training costs and difficulties associated with keeping a large body of technicians fully trained in the latest technologies in a rapidly changing/advancing technological telecommunications industry. It is often more cost effective for a field technician to work under the direction of the higher skilled FMAC staff.

Use of these intelligent network elements reduce the labor required to install, commission, provision and maintain them since there are sophisticated test and performance capabilities built into the software, significant reductions in test sets and associated costs are also realized.

24. ISDN Loop Conditioning

24.0 General

Technical Description:
The ILECs must provide 2-wire (1 Pair) and 4-wire (2 pair) non-loaded (NL) unbundled loops that will support Digital Subscriber Lines (DSL) that have the ability to support digital voice, circuit switched data, and packet switched data.

The unbundled 2-wire loops should have the capability of providing a minimum of 160 Kb/s total bandwidth. The unbundled loop should also be plastic insulated conductor (PIC) cable, with an estimated measured loss (EML) not to exceed 15,000 feet (15kFt), nominal 26 gauge, unloaded (NL) copper, equalization of 42dB at 40kHz at approximately 15kFt, or provided as a virtual channel on a physical digital loop carrier (DLC) or similar digital copper or fiber facility that terminates on a loop concentrator or multiplexer.

The unbundled loop(s) should also meet the standard ANSI interface to the network side of the network termination (NT1) customer premise equipment(CPE). When the loop is conditioned properly, the DSL should also have the capability to provide service to up to eight users on a multi-point interface on the customer side of the NTI CPE.

For detailed requirements and objectives on the characterization and attributes of access, transport, and subscriber loops for DSL services, you may refer to ST-TSY-000041, TR-NWT-000393, ANSI-T1.601-1992, TR-NWT-000397, ANSI-T1.604-1990, and/or other related technical reference specifications.

Loop conditioning -- such as the de-loading and removal of excessive bridge tap -- should be recovered through the recurring charges under a maintenance account in ARMIS.

2-wire TWP (Twisted Pair) copper loops under 9k/ft as modeled here, do not require loading. TR-303/IDLC technology also does not require loading of loops because the loops are carried over fiber (SONET) feeder to the remote terminal (RT).

Therefore, any assumption for the cost of de-loading loops is not appropriate, and should not be included in any NRCs for loops.

25. Customer Network Control (Flexcom):

25.0 General

Technical Description (recombination of transport):
The Flexcom OSS is a Bellcore Customer Network Control System for Reconfiguration/Recombining DS1, DS3, STS-1, SONET, and other Transport Systems. The Bellcore FLEXCOM OSS System provides a Network Management System (NMS) software platform, which supports integrated Inventory, Configuration, Fault, Performance, and Security Management of multi-vendor wide-band and broadband Digital Cross-connect System (DCS), Electronic Digital Signal Crossconnect Systems (EDSX), and SONET Add-Drop Multiplexers (ADM) Network Elements (NE). FLEXCOM allows secured partitioning of asynchronous (DS0, DS1, DS3), as well as SONET (VT1.5, STS-1, STS-3, STS-12) transport services, for allocation to and management by end-user customers (e.g., Boeing, 3M, Lockheed/Martin, Banking Industry, School Systems, Broadcast Video Providers, etc.) or service provider personnel such as CLECs, ILECs, or CAPs.

The FLEXCOM System allows telecommunications service providers, or their end-user customers to remotely control and automatically reconfigure their leased network bandwidth. This also allows customers the ability to collect, distribute, and reconfigure bandwidth from multiple locations for maximum network effectiveness and efficiency.

Feature/Functionality of the FLEXCOM System includes:
- Bandwidth on demand
- Performance Monitoring
- Alarm Surveillance
- Inventory (database) and Control of DS0, DS1, DS3 bandwidth
- Fractional DS-1
- SONET STS-1, VT1.5 Control
- Disaster Recovery Modeling
- Network Element Partitioning and Security
- Usage Sensitive Billing

THIS SECTION INTENTIONALLY LEFT BLANK.

FLEXCOM DOCUMENTATION IN PROGRESS

TO BE PROVIDED IN A FUTURE RELEASE.

26. Transactions Costs

26.0 General

In the purest sense, the TELRIC cost of the three transactional functions (pre-ordering, ordering and provisioning) is zero, because:

- The cost of the OSS themselves and the equipment used to run them is recovered in recurring rates as discussed in "Recovery of Operations Support System Investment".
- The cost of the power required for that equipment also is recovered in recurring rates as discussed in "Recovery of Operations Support System Investment".
- The decision to have fallout is an overall network management decision where investments and maintenance of OSS and associated databases have been deferred and the resulting extra labor should be recovered in recurring rates.

In deference to the long-standing practice of charging for these functions in an up-front charge, however, the AT&T/MCI Non-Recurring Cost Model does not assign the transactional costs to recurring rates, although it would be theoretically correct to do so.

The cost driver for TELRIC-based transaction charges is labor cost. A typical non-recurring charge cost study consists of determining the tasks that are required to be performed manually, the amount of time it takes to perform the task, the frequency with which the task must be performed and the cost per hour of the personnel who perform the task. Assuming, as TELRIC requires, that the forward looking OSS is operating optimally, manual activities for pre-ordering, ordering and provisioning should be very infrequent.

No equipment or other costs besides labor are included in TELRIC NRCs because these are not transactional costs, but recurring costs. To perform the three transactional functions of pre-ordering, ordering and provisioning, aside from labor when there is fallout, incumbent local exchange carriers use software, computers and power. All of these are accounted for in recurring costs for unbundled network elements.

27. Telecommunications Management Network (TMN)

27.0 General

TMN OSS compliant systems and processes will best deliver customer service requirements and support a competitive environment. It should be noted at the same time, that TMN compliant OSS in themselves are only part of the "Forward Looking" architecture. A forward looking network with "Intelligent" Network Elements are critical in the effectiveness of the end to end "process flow" through the OSS.

FCC direction for Local Competition indicates that a forward looking approach should be utilized when cost modeling the Network Elements and Provisioning Process. (FCC 96-325 First Report and Order, Para. 690). In TELRIC, Forward Looking economic costs are those that will provide the most efficient available OSS in the most efficient manner.

It is now generally acknowledged within the Telecommunications industry that ***the most*** forward looking OSS and INEs are those that are compliant with the TMN industry standard. TMN not only provides for the automation and flow-through capabilities that exist today, but it goes beyond that to provide "interoperability of operations systems from different software vendors[12]"

It is also in the best interest of all providers to continue to push for fully TMN compliant systems and processes in order to accomplish the fairest and most competitive environment that will benefit customers most in the long term.

The most forward looking OSS "legacy systems" architecture that currently exists within the ILEC industry is assumed and modeled in the NRC Model as opposed to only TMN compliant systems, for the following reasons:

(1) existing forward looking legacy OSS, when efficiently operated and maintained, provide automated and flow through functionality that is similar in nature to TMN compliant systems
- (a) all databases are updated on a timely basis and are consistent with each other
- (b) OSS are appropriately sized and electronically linked
- (c) OSS use front end edits to minimize the possibility that erroneous information is entered
- (d) OSS rely on the latest software releases and reside on high availability platforms

(2) use of the existing OSS's for costing purposes is a conservative approach since some of the existing OSS's are not as robust as fully TMN compliant systems.

(3) costs for fully TMN compliant systems are not readily available, and

(4) some legacy OSS can be upgraded to be fully "TMN capable" OSS (e.g. PREMIS to ALOC/CNUM, WFA to FORCE, NMA to WATCH, etc.)

It should also be noted that while OSS that are fully TMN compliant will function best with TMN compliant technology, efficient technology assumptions are not necessarily all TMN compliant.

[12] Operations Support: The Next Generation, Bellcore Exchange Pub. Summer 1997, pp. 12-15

28. Element Types

28.0 General

The following lists the Element Types included in the NRCM. These were selected for modeling based on a review of the charges proposed by ILECs during negotiation and arbitration proceedings. These Element Types consist primarily of all work activities performed in the delivery of each service to existing customers (migration)[13] and new customers(installation)[14].

In NRCM 2.2, there are 49 Element Types that are listed on the following pages of this NTAB Document.

[13] Migration is defined as moving existing ILEC customers to a CLEC.

Types of Non-Recurring Charges

	Name
1	POTS / ISDN BRI Migration (TSR)
2	POTS / ISDN BRI Install (TSR)
3	POTS / ISDN BRI Migration (UNE Platform)
4	POTS / ISDN BRI Install (UNE Platform)
5	POTS / ISDN BRI Disconnect (TSR / UNE Platform)
6	POTS / ISDN BRI Migration (UNE Loop)
7	POTS / ISDN BRI Install (UNE Loop)
8	POTS / ISDN BRI Disconnect (UNE Loop)
9	Feature Changes
10	4 Wire Migration (UNE Loop)
11	4 Wire Install (UNE Loop)
12	4 Wire Disconnect (UNE Loop)
13	2 Wire Migration at the FDI
14	2 Wire Disconnect at the FDI
15	4 Wire Migration at the FDI
16	4 Wire Disconnect at the FDI
17	2 Wire Migration at 6 line NID
18	Channelized DS1 Virtual Feeder to RT Install
19	Channelized DS1 Virtual Feeder to RT Disconnect
20	DS1 Interoffice Transport Install
21	DS1 Interoffice Transport Disconnect
22	DS3 Interoffice Transport Install
23	DS3 Interoffice Transport Disconnect
24	2 Wire Loop, different CO Migration
25	2 Wire Loop, different CO Install
26	2 Wire Loop, different CO Disconnect
27	4 Wire Loop, different CO Migration
28	4 Wire Loop, different CO Install
29	4 Wire Loop, different CO Disconnect
30	DS1 Loop to Customer Premise Migration
31	DS1 Loop to Customer Premise Install
32	DS1 Loop to Customer Premise Disconnect
33	DS3 Loop to Customer Premise Migration
34	DS3 Loop to Customer Premise Install
35	DS3 Loop to Customer Premise Disconnect
36	Line Port (DS0, Analog, ISLU) Install
37	Line Port (DS0, Analog, ISLU) Disconnect
38	Channelized DS1 line port (TR-303-IDT) Install
39	Channelized DS1 line port (TR-303-IDT) Disconnect
40	Fiber Cross Connects Install (LGX)
41	Fiber Disconnect (LGX)
42	SS7 Links (DS0) Install
43	SS7 Links (DS0) Disconnect
44	SS7 Links (DS1) Install
45	SS7 Links (DS1) Disconnect
46	SS7 STP global title translations 'A Link' only Install
47	SS7 STP global title translations 'A Link' only Disconnect
48	SS7 STP message transfer part 'A Link' only (port) Install
49	SS7 STP message transfer part 'A Link' only (port) Disconnect

Element Type 1: POTS / ISDN BRI - Migration - TSR

Definition: POTS is Plain Old Telephone Service. ISDN/BRI is Integrated Services Digital Network/Basic Rate Interface.

Objective: Move an existing POTS or ISDN/BRI from an ILEC to a new entrant (CLEC).

Environment: TSR (see Model Description for TSR description)

Key Drivers of Cost:
Variable Input
- Labor Rate
- Variable Overhead
- Fallout %

Work Value Input
- Manual Work Step Times

High Level Process Overview:

Transmission Type: Analog x Digital x.
Unbundled Loop: Yes__ No x.
Examples of services used on this element type:
Residence Line 1FR, 1MR
Business Line 1FB, 1MB

Time Estimates: Activity times are based on estimates provided by a panel of Subject Matter Experts.

Sample Output: See Attachment B

Detailed Work Activities: See Attachment C

The provisioning activities provide a high level overview of the OSS processing actions required to change an existing USOC (Universal Service Order Code) to a TSR USOC.

Migration includes revising/establishing a customer record for:
Billing - CRIS/CABS
Maintenance - LMOS/WFA
Corporate Database - NSDB

Fallout:
It is assumed that fallout of the order will occur 2% of the time. Manual assistance will be required from a center called the Recent Change Memory Administration Center (RCMAC). The activities include the following:
1. pull and analyze the order
2. clear the jeopardy

Fallout has been included to address situations where a customer requested changes such as; a pending order that has not yet been completed or a change in the effective date.